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CACTUS CULTURE

For Amateurs.

By WILLIAM WATSON, A.L.S., *Curator, Royal Botanic Gardens, Kew.*

OPUNTIA IN FLOWER.

Fourth edition

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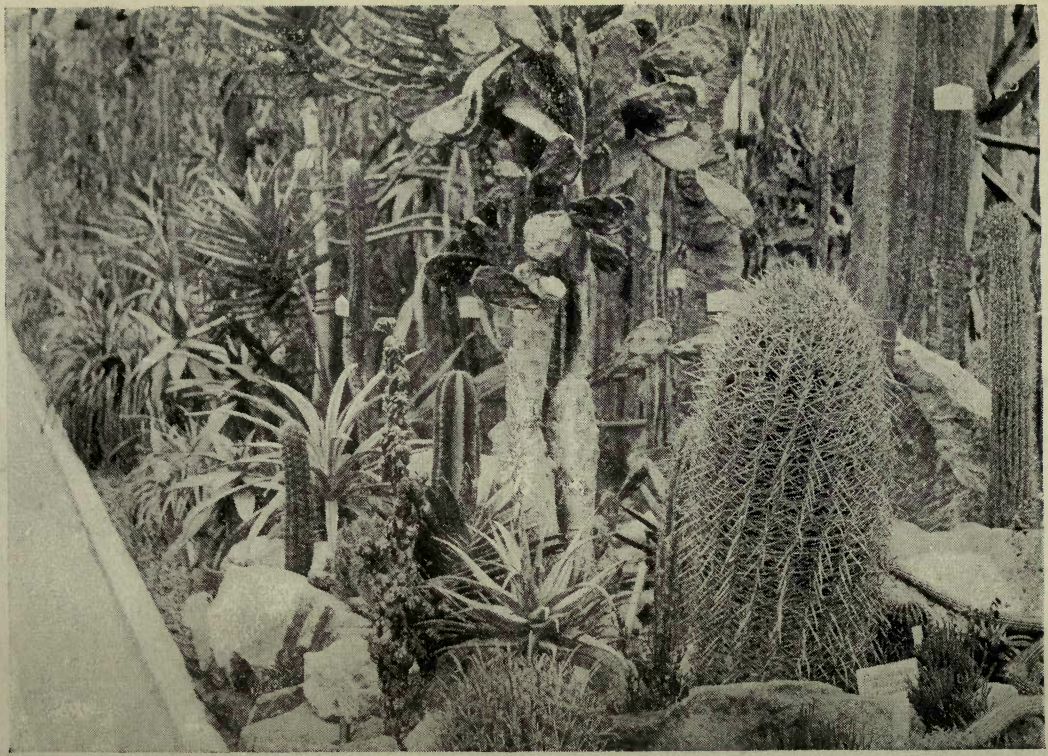

Photo by [*C. P. Raffill.*

Cactus Culture for Amateurs:

A CONCISE AND PRACTICAL GUIDE TO THE MANAGEMENT OF A LITTLE-UNDERSTOOD FAMILY OF PLANTS.

FOURTH EDITION: REVISED AND BROUGHT UP TO DATE.

By **WILLIAM WATSON,**
Curator of the Royal Gardens, Kew.

ATTRACTIVELY ILLUSTRATED.

LONDON:
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PREFACE.

THE first edition of "Cactus Culture" was published in 1889. A second was called for in 1903, a third some years later, and now a fourth edition has become necessary. The work has been carefully revised, a number of species have been omitted owing to their not being in cultivation in this country, and others of recent introduction have been added. Botanical works reveal that many new additions to the Order *Cactacea* have been made, some of which, no doubt, are now in cultivation in American gardens, where Cacti are more in favour than they were. Considerable alterations in the classification of nomenclature of the plants have been made by American botanists, but it has not been thought advisable to follow them here, the names used in this book being the same as are in use at Kew.

CACTUS CULTURE FOR AMATEURS.

Chapter I.

INTRODUCTION.

THE Cactus family is not as popular with English horticulturists in these days as it was formerly, scarcely a dozen species out of about a thousand known being included among favourite garden plants. It is not, however, very many years ago that there was something like a Cactus cult.

"About the year 1830, Cacti began to be specially patronised by several rich plant amateurs, of whom may be mentioned the Duke of Bedford, who formed a fine collection at Woburn Abbey, the Duke of Devonshire, and Mr. Harris, of Kingsbury. Mr. Palmer, of Shakelwell, had become possessed of Mr. Haworth's collection, to which he greatly added by purchases; he, however, found his rival in the Rev. H. W lliams, of Hendon, who formed a fine and select collection, and, on account of the eagerness of growers to obtain the new and rare plants, high prices were given for them, ten, twelve, and even twenty and thirty guineas often being given for single plants of the Echinocactus. Thus private collectors were induced to forward from their native countries—chiefly from Mexico and Chili—extensive collections of Cacti." *

The popular belief with respect to Cacti is that they are stiff and wanting in beauty, remarkable only in that they are exceedingly curious in form. It is true that only few of them possess any claims to gracefulness of habit or, when not in flower, would answer to our present ideas of beauty with respect to the plants we cultivate. Nevertheless, the stems of many are attractive on account of their strange, fantastic forms, their spiny clothing, the absence of leaves, except in very few cases, and their singular manner of growth.

* J. Smith, the first Curator of the Royal Gardens, Kew.

If their stems are more curious than beautiful, their flowers are often large in size and rich in colour, and some of them are deliciously fragrant. Those which open their huge blossoms only at night are particularly attractive, and in the early days of Cactus culture the flowering of one of these was a great event in English horticulture.

A point in favour of the plants of the Cactus family for gardens of small size, and even for window gardening is the simpleness of their requirements. Their tough-skinned succulent stems enable them to live for an extraordinary length of time without water. They are children of the dry barren plains and mountain sides, living where scarcely any other form of vegetation could find nourishment, and thriving with the scorching heat of the sun over their heads, and their roots buried in the dry, hungry soil or rocks which afford them anchorage and food.

Chapter II.

CULTIVATION.

By noting the conditions in which plants are found growing in a natural state we may obtain some clue to their successful management when placed under conditions more or less artificial, and in the case of Cacti knowledge of this kind may be helpful. With few exceptions, they will not thrive in any but sunny lands, where, during the greater part of the year, dry weather prevails.

Cacti are almost all American, being most abundant in California, Mexico and Texas; also in the provinces of Central and South America, as far south as Chili, and in many of the islands. "There is hardly any physiognomical character of exotic vegetation that produces a more singular and ineffaceable impression on the mind of the traveller than an arid plain densely covered with columnar or candelabra-like stems of Cactuses, similar to those near Cumana, New Barcelona, Cora, and in the province of Jaen de Bracamoros."* Cacti are as peculiar a feature of the vegetation of the New World as the Heaths are of the Old, or as Gum-trees in Australia.

The Opuntias, or Indian Figs, are now widely distributed. In countries bordering the Mediterranean, in South Africa and in Australia, they have long been naturalised, and have become a serious nuisance to farmers and landowners.

Although the countries in which Cacti naturally abound are, for the greater portion of the year, dry and warm, heavy rains occur at certain periods, often accompanied by extreme warmth and bright sunshine. It is during this rainy period that new growth is made.

There is nothing in the nature of the requirements of Cacti to render their successful management difficult to anyone who possesses a heated greenhouse, or even a window recess to which sunlight can be admitted during some portion of the day. In large garden establishments it is possible to provide a spacious house specially for their cultivation in which many of them may attain a large size. One may sometimes see them growing in a cottager's window or in a small greenhouse, and in health and beauty they are at least equal to any grown in the most elaborately prepared plant-houses.

* Humboldt's "Views of Nature."

Wardian Cases.

Many of our readers will be acquainted with the neat little glass cases, like a greenhouse in shape, and filled with a collection of miniature Cacti. To the professional gardener, these cases are playthings, bearing about the same relation to gardening as a child's doll's house does to housekeeping. Yet they are the source of much pleasure, and even instruction, to many to whom a greenhouse is an impossibility. In these little cases it

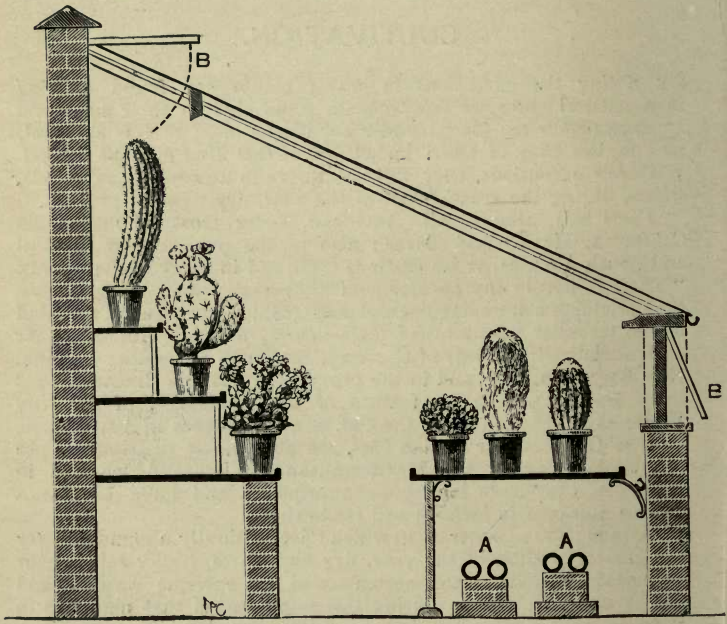

Fig. 1.—Section of House for Cacti.
A, A, Hot-water Pipes; B, B, Ventilators.

is possible to grow a collection of tiny Cacti for years, if only the operations of watering, potting, ventilating, and other matters are properly attended to.

Window-recesses.

Quite large specimens may be grown in windows with a south aspect attached to rooms where fires are kept during cold weather. Phyllocactus, Epiphyllum, Cereus, Mamillaria, and others are successfully grown in England, while in Germany Cacti

are as popular among the poorer classes as the Fuchsia, the Pelargonium, and the Musk are with us It is no unusual thing to see a fine example of the Rat's-tail Cactus (*Cereus flagelliformis*) in the window of a cottager's dwelling with its long, tail-like growths and handsome rose-coloured flowers.

Greenhouses.

Cacti are easy to accommodate in a greenhouse, either as the sole occupants or on shelves or brackets placed near the glass roof. If the greenhouse is not fitted with hot-water pipes, many species may yet be grown if, during winter, they are kept safe from frost. In heated structures the selection may be made according to the space available, and to the temperature that can be maintained. Fig. 1 represents a section of a suitable house for Cacti. Its aspect should be due south.

When grown on their own roots, the Epiphyllums, as well as the pendant-growing kinds of Rhipsalis, and several species of Cereus. may be placed in baskets and suspended from the roof. The baskets should be lined with thin slices of fibrous peat, and the whole of the middle filled with the compost recommended on page 6. The climbing species are usually planted on a mound composed of loam and brick-rubble, and their stems either trained along rafters or allowed to run up the back wall of a greenhouse, against which they root freely, thriving and flowering with very little attention.

Frames.

Wherever the place selected for Cacti may be, whether in a large greenhouse, a frame, a window, or in the open, it is of vital importance that the position should be exposed to bright sunshine during most of the day. Without sunlight, these plants can no more thrive than can a Sundew. Continental growers of Cacti bring on their young plants in frames as follows: In April or May a hotbed of manure and leaves is prepared and a frame placed upon it, facing south. Six inches of soil is put on the top of the bed, and in this, as soon as the temperature of the bed has fallen to about 70 deg., the young plants are planted in rows. The frames are kept close even in bright weather, except when there is too much moisture inside, and the plants are syringed twice daily in dry, hot weather. The growth they make under this treatment is astonishing. In autumn the plants are ripened by exposure to sun and air before being lifted and planted in pots for sale. This method might be adopted in England.

Out of Doors.

There are some species which may be grown out of doors altogether, if planted in a sunny, sheltered position among stones, and protected from snow and heavy rain in winter

by means of a handlight or pane of glass. The collection at Kew is planted in recesses formed by the buttresses of the Palm-house, where large groups may be seen growing on the sunny (S.W.) side of the house. The border is raised by means of pieces of sandstone and loam, and the plants are placed so that they can sprawl over the stones. They thrive exceedingly well in this position. In severe weather a garden mat is thrown over them. So far as temperature is concerned, it is never so cold in any part of England as in the haunts of these plants in the Rocky Mountains of Colorado, &c., where 40 deg. to 50 deg. of frost are not unusual, and at a time when the plants are bare of snow. It is probably the alternations of cold and wet, frosty, and muggy weather experienced in our climate that prove fatal to them. A sunny unheated frame would be the best of all situations for them.

The following are hardy at Kew : *Cereus Fendleri, C. Engelmanni, C. viridiflorus, Echinocactus glaucus, E. Simpsoni, E. Pentlandii, Mamillaria missouriensis, M. Nuttallii, M. Purpusi, M. Spathiana, M. vivipara, Opuntia bicolor, O. Engelmanni, O. fragilis* (*brachyarthra* is a variety of this), *O. polyacantha*, vars. (*O. missouriensis* is a synonym of this), *O. Rafinesquii*, vars., *O. rhodantha, O. xanthostema, O. arkansana, O. vulgaris, O. picolominiana, and O. humilis.*

Soil.

The conditions in which plants grow naturally are what we are told to imitate for their cultivation ; but, whilst admitting that Nature, when intelligently followed, would not lead us far astray, we must not follow her too strictly when dealing with plants in gardens. Soil is only one of the conditions on which plants depend, and where the other conditions are not the same in our gardens as in Nature, it is often best to use a different soil from that in which the plants grow when wild.

It has been stated that plants do not grow naturally in the soil best suited for them. The reason why they are found in peculiar places is not because they prefer them, but because they alone are capable of existing there, or because their stouter neighbours crowd them out. There are plants that succeed equally well in widely different soils, and a soil which may be suitable for a plant in one place, may prove totally unsuited in another.

Cacti are rather particular with respect to soil, almost all of them thriving in a soil that is principally loam. Plants which are limited in nature to sandy, sun-scorched plains or the glaring sides of rocky hills and mountains, where scarcely any other form of vegetation can exist, are not likely to be gross feeders. They are healthiest and longest-lived when planted in a light loamy soil. Therefore, in preparing soil for them, a good loam, with plenty of grass fibre in it, should form the principal ingredient, sand and small brick-rubble being added—one part of each of the latter

to six parts of the former. The brick-rubble should be broken to the size of peas and hazel-nuts. Lime rubbish is sometimes recommended in place of brick-rubble.

For Epiphyllums and Rhipsalis a mixture of equal parts of peat and loam, with sand and brick-rubble in the same proportion as before recommended, will be found most suitable. Leaf mould is sometimes used for these plants; but unless really good it is best left out of the soil. The finest Epiphyllums have been grown in a soil which consists almost wholly of a light fibry loam, with the addition of a little crushed bones.

Potting.

Cacti do not like too frequent disturbance at the roots. In April and May, established plants should be examined, and if the roots are in a healthy condition, they should be left undisturbed for another year. If the roots are decayed, the soil should be shaken away from them, all decayed portions cut off, shortening the longest roots to within a few inches of the base of the plant.

The sizes of pots most suitable for Cacti are what would be considered small for other plants. When wild, their roots are often crowded in a small space between boulders. With their roots cramped, growth is firmer and the flowers are produced in much greater profusion than when liberal root space is afforded. The pots should be well drained—about one-fifth of their depth filled with drainage, and over this a layer of rough fibry material should be placed. The soil should be pressed very firmly about the roots, keeping the base of the plant an inch or so below the surface.

Plants with weak stems require stakes, and even the stout stems, when their roots are not strong enough to hold them firmly, require the support of one or two strong stakes till they have made new roots and got firm hold of the soil. Epiphyllums, when grown as standards, should be tied to strong wire supports, those with three short, prong-like legs being most desirable, as, owing to the weight of the head of the plant, a single stake is not sufficient to hold the whole firmly. After potting, no water should be given till signs of fresh growth are perceived, when they may be well watered, and as often afterwards as the soil approaches dryness. Newly-imported plants, which on arrival are usually much shrivelled and rootless, should be potted in rather dry soil and small pots, and treated as recommended above. Cacti are able to exist a long time on the nourishment stored up in their stems. A remarkable instance of this has been recorded at Kew. A plant of *Pilocereus senilis*, which had grown too tall for the house, was cut off at the base and placed in the museum as a specimen. Here it gradually dried up to within 2 feet of the top, where a fracture across the stem had been made. Above this the stem remained fresh and healthy. Some months afterwards, it was found that not only had the top

of the stem remained green, but it had formed roots of its own, which had grown down the dead lower portion of the stem, and were perfectly healthy. We sometimes find when examining Cactus stems that decay has commenced; this is carefully cut out with a sharp knife, and the wound exposed to the action of the air till it is dry and callused.

Watering.

It will have been gathered that during their season of growth Cacti generally require a good supply of moisture at the root and overhead, followed by a period of rest, that is, almost total dryness, with all the sunlight possible. Their growing season is from the end of April to the middle of August, and during this time they should be kept moderately moist at the root, but not constantly saturated. In a wild state the frequent and heavy rains which occur in the earlier part of the summer in the American plains supply the moisture necessary to enable these plants to make fresh growth. After August, little or no rain falls, and they then gradually assume a shrivelled appearance, which is really a sign of ripeness, promising a plentiful crop of flowers when the rainy season again returns.

As the sun in England is never so powerful as in the hot plains of America, it will be evident that, if flowers are to be produced, we must see that the plants have sufficient water in early summer, and little or none during the autumn and winter, whilst the whole year round they should be exposed to all the sunlight possible. It is important to remember that if water is liberally supplied throughout the summer, the plants cannot obtain the rest which is necessary to their ripening and producing flowers, dryness at the root alone being not sufficient, it must be accompanied by exposure to bright sunlight before the summer is over.

In a garden where Cacti are well managed they are treated as follows: For the genera Cereus, Echinopsis, Echinocactus, Mamillaria, Opuntia, and Melocactus moist tropical conditions are provided. In April the plants are well watered at the root, and syringed overhead both morning and afternoon on all bright days. This treatment is continued till the end of July, when syringing ceases and watering is gradually reduced. At the end of August the plants are placed in a light frame with a south aspect. Here they are kept till the summer is over, and are watered about once a week. The lights are removed on bright sunny days, but are kept on in wet or dull weather and at night. Under this treatment many of the species assume a reddish appearance, and the thick fleshy-stemmed kinds shrivel somewhat. This need not cause any alarm; on the contrary, it is looked upon as a good sign for flowers.

On the approach of cold weather the plants are brought back into the house and kept quite dry at the roots till the return of spring, when their flowers develop either before or soon after the growing season commences.

Hitherto we have been dealing with Cacti which have thick fleshy stems; but there are the genera Rhipsalis, Epiphyllum, and Phyllocactus, which are not capable of bearing a long period of drought, though they may be kept almost dry at the root during winter. In summer they delight in plenty of water, and, when growing freely, weak manure water is good for them. Epiphyllums must be kept always more or less moist at the root. For the several species of Opuntia and Echinopsis, which are sufficiently hardy to be cultivated out of doors, it will be found a wise precaution to place either a pane of glass or a handlight over the plants for the winter, not so much to serve as protection from cold as to shield them from an excess of moisture at a time when it would prove injurious.

Temperature.

As the amount of heat required by the different species of Cactus varies considerably, the temperature required by each will be given when describing it. The majority may be kept alive in one house where all would be subjected to the same temperature, but some would then merely exist, and would not flower. At Kew, for example, owing to the arrangements necessary for the public, the majority of the large collection of Cacti are grown in one large house, where the plants present an imposing appearance, but a good number of the species rarely produce flowers. The plants which inhabit the plains of the Southern United States are subjected to a high summer temperature and a cold winter, while those found in Central and South America do not undergo these extremes.

Insect Pests.

Notwithstanding the thickness of their skin, all Cacti are subject to attack by various insect pests, especially mealy bug and scale. There is no difficulty in removing such insects from the plants with few or no spines upon their stems; but those thickly covered with spines and hairs are not so easy to keep clean. The best, cheapest and most effectual insecticide for Cacti is paraffin, its only drawback being the injury it does to the plants when applied carelessly. A wineglassful added to a gallon of soft water, and about 2 oz. of soft soap, the whole to be kept thoroughly mixed by frequently stirring it, forms a solution strong enough to destroy mealy bug. In applying it, a syringe should be used, or, if the plants are to be dipped overhead, care must be taken to keep the oil thoroughly mixed with the water, or the plant, when lifted out, will be covered with pure paraffin.

The plants should be laid on their sides to be syringed, and after they have been thoroughly wetted, they may be allowed to stand for a few minutes before being well syringed with pure water. Plants that are badly infested with mealy bug should be syringed with the paraffin mixture once a day for about a week. It is easy to do serious harm to these plants by using a stronger solution than is here recommended, and also by not properly mixing the oil with the soap and water.

When thrips attack Phyllocactus, Rhipsalis, and Epiphyllum fumigation with tobacco, dipping in a strong solution of tobacco, or sponging with soapy water are effectual remedies.

A blight, similar to mealy bug, sometimes appears on the roots of Echinocactus and Cereus. It may be destroyed by dipping the whole of the roots in the mixture recommended for the stems when infested by mealy bug, and after allowing them to stand for a few minutes, immersing them in pure water. In a day or two they should be repotted into new compost.

Diseases.

The larger kinds of Cactus are said to live to a great age, some of the tree kinds, according to Humboldt, bearing evidences of having existed several hundred years. The same longevity, most likely, is found in the smaller kinds when wild. Under cultivation, however, the health of these plants is less certain. Large specimens newly imported have never lived longer than a few years. When decay sets in it should be cut out with a sharp knife, and the wound exposed in a dry atmosphere for a few days till it has dried, when it may be replanted. The cause of decay at the base or in the side of the stem of these plants is no doubt due to the absence of some necessary condition when the plants are cultivated.

Grafted plants, especially Epiphyllums, when worked on to Pereskia stocks, are apt to grow weak and flabby through the stem wearing out, or through the presence of mealy bug or other insects, in which case it is best to prepare fresh stocks and graft on to them the healthiest pieces of the old plant.

Chapter III.

PROPAGATION.

Cacti are readily multiplied either from seeds, cuttings of the stems, or by grafting.

Seeds.—The process of germination and the development of the seedling is full of interest, the changes from one form to another being very marked in most of the genera. Good seeds germinate in from two to four weeks after sowing in a temperature of 70 deg. In a lower temperature they take longer, but if properly managed as regards soil and water unless in a very low degree of heat they rarely fail to germinate. Pots or pans containing drainage to within 2 inches of the top, and then filled up with finely sifted loam and sand, three parts of the former to one of the latter, and pressed down moderately firm will be found suitable. The soil should be moist at the time of sowing, and the seeds should be scattered thinly over the surface, covering them with about $\frac{1}{8}$ inch of soil. Over this a pane of glass may be placed till the seedlings appear above the soil to prevent it from drying and so retarding germination.

The seeds may be sown at any time, but it is best to sow them in spring, as, after germinating, the young plants have the summer before them, whereas plants raised from autumn-sown seeds have a poorer chance. The seeds of all the genera are small, and the seedlings are at first tiny beadlike masses of watery flesh, very different from the seedlings of ordinary garden plants. This character is shown at Fig. 2. It is interesting to note how the soft, fleshy mass which first grows out of the seed is nothing more than a little bag of food with a tiny growing-point fixed in its top, and that as the growing-point increases the food bag decreases, till finally the whole of the latter is absorbed into the young stem as it becomes capable of obtaining nourishment by means of roots. In Opuntia, the cotyledon stage (see Fig. 3) is different from that of Cereus. Still, though the form is different, the purpose of the two cotyledons and juicy stem is the same ; and as the plant develops the cotyledons shrivel and fall off. As soon as the seedlings are large enough to be handled they may be planted separately in small pots, using a compost slightly coarser than that in which the seeds are sown. They should be kept moist till the summer

is over; and in winter a little water should be given at intervals of a week.

Seeds are sometimes produced by cultivated Cacti, and it is worth while to encourage them to do this by pollenating the flowers of plants of which stock is desired. Some species are capable of self-fertilisation; still, it is always as well to give them assistance. The night-flowering species must, of course, be fertilised either at night or very early in the morning. A number of hybrids have been raised in gardens, particularly of Epiphyllum and Phyllocactus,

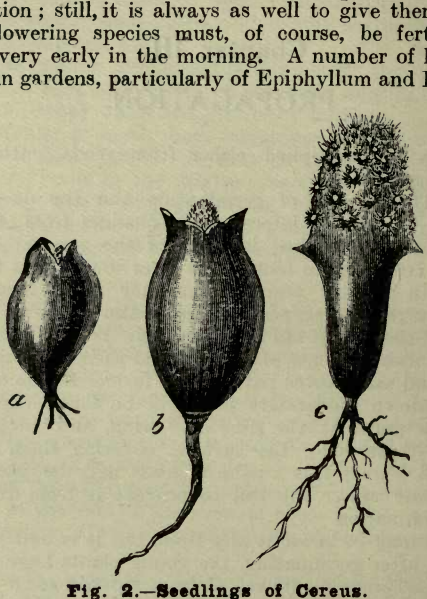

Fig. 2.—Seedlings of Cereus.

a, One month after germination. *b*, Two months after germination. *c*, Three months after germination. (Magnified six times.)

and crosses between Epiphyllum and Phyllocactus and *Cereus flagelliformis* and *C. speciosissimus* have been bred artificially. The whole order offers a very good field for the hybridist.

Cuttings.

The stems of Cacti strike root freely in a warm temperature. We have already seen how, even in the dry atmosphere of a museum, a stem of Cereus emitted roots and remained healthy for a considerable time. Cactus experts do not hesitate when large-growing specimens get too tall for the house in which they are grown to cut off the top of the stem, even to a length of 6 feet or 8 feet, to form a new plant, whilst the beheaded stem is kept for stock, as it often happens that just below the point where

the stem was severed shoot buds are developed, and these are afterwards removed and used as cuttings. Opuntias are treated in the same way, even the largest branches rooting freely. Cactus stems are so different from those of other plants, that no comparison can be made in respect of their root-developing capacity. The very soft, fleshy stem should be allowed to dry at the base before setting it in the soil. If the base of a plant decays, all that is necessary is the removal of the decayed portion, exposure of the wound to the air for two or three days, and then planting it in dry

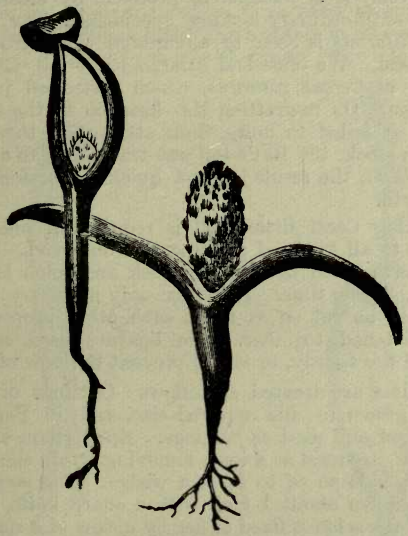

Fig. 3.—Seedlings of Opuntia, showing Mode of Germination.
(Magnified three times.)

sandy soil, placing it in a warm moist house to root. Plants that branch or produce offsets, are readily propagated by means of cuttings, preferably in early spring.

Grafting.

The object of grafting is to effect certain changes in the nature of the scion by uniting it with a stock of a character different from its own, for the better production of flowers, fruit, etc., or to multiply plants which are not readily increased by the ordinary methods of cuttings or seeds. In the case of Cacti, resort is had to grafting for some of the kinds, and especially the

smaller ones, which are apt to rot at the base when on their own roots. By this means they are raised above the soil whence the injury in winter usually arises, and they are also supplied with food by the roots of the more robust stock upon which they are grafted. Grafting is also adopted for some species to add to the grotesqueness of their appearance; a spherical Echinocactus or Mamillaria on the columnar stem of another so as to produce the appearance of a drum stick; or a large turnip-like stem on three slender ones suggesting a three-legged stool. As they unite freely with each other, it is possible to produce by means of grafting some very extraordinary-looking specimens. The long drooping *Cereus flagelliformis* is seen to advantage when growing upon a tall erect stem. We once had a large Rat's-tail Cactus growing on a stem of *Cereus rostratus*, which rotted off just below the point of union. On re-grafting this head on to the Cereus a little lower down, it failed to unite, and, attributing the failure to ill-health in the stock, the Rat's-tail was transferred to a large stem of *Pereskia aculeata*, the result being a quick union followed by free healthy growth.

For grafting Cacti little skill is required if one or two rules, which apply to all kinds of grafting, are observed. The period of vigorous growth when the sap of stock and scion is in motion is the most favourable time. It is then only necessary that the parts grafted should be cut so as to fit each other properly, and then bound or fastened together. The ligature used should not be wound round too tightly, or it will prevent the flow of sap.

Epiphyllums are treated as follows: Cuttings of Pereskia are rooted and grown to the required size, and in September their tops are cut off and used as cuttings. Epiphyllum shoots, usually about 6 inches, are used as scions, removing a thin slice of the fleshy stem on each side so as to form a wedge. The stem of Pereskia is then split down about 1 inch with a sharp knife, and into this the wedge of the scion is fixed either by means of a small pin passed through it and the stem about half-way up the slit, or by binding round them a little worsted or bast. The worked plants are then placed in a frame having a temperature of about 75 degs., and are kept moist by a daily sprinkling with water. As soon as a union has been effected, which will be seen by the scion beginning to grow, the ligature and pin should be removed, and the plants gradually hardened off.

For the spherical-stemmed kinds of Mamillaria, Cereus, Echinocactus, etc., a different method is practised. Instead of cutting the base of the scion to a wedge-shape, a portion of the bottom is sliced off, and a stock procured which, when cut across the top, will about fit the wound, the two sliced parts are placed together and secured either by passing a piece of matting a few

times over the top of the scion and under the pot containing the stock, or by placing three stakes around it in such a way that, when tied together at the top, they will hold it firmly in position. Another method is that of cutting the top of the stock in the form of a round wedge, and then scooping a hole out in the centre of the scion large enough to fit this wedge, holding them together in the manner above mentioned.

To graft a spherical stem on three columnar ones, the latter must first be established in one pot and, when ready for grafting, cut at the top into rounded wedges, three holes to correspond being cut into the scion. When fixed, the top should be securely fastened by tying it to the pot, or by means of stakes. For this last operation,

Fig. 4.—Graft of Mamillaria recurva on Cereus nycticalus.

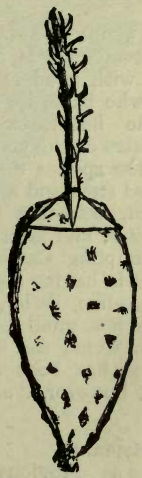

Fig. 5.—Graft of Opuntia decipiens on O. Ficus-indica.

a little patience and care are necessary to make the stocks and scions fit properly. In the accompanying illustrations, we have a small Mamillaria stem grafted on to the apex of the tall quadrangular-stemmed Cereus (Fig. 4), and a cylindrical-stemmed Opuntia worked on a branch of the flat, battledore-like Indian Fig (Fig. 5).

Chapter IV.

ANHALONIUM.

A SMALL genus of anomalous character, founded by Lemaire in 1839, but afterwards reduced to *Mamillaria*. It has again been restored, with good reason, by an American botanist, Mr. J. M. Coulter, who bases its generic distinction on the absence of spine-tufts, the imbricated tubercles in two series, the production of the flowers on the young tubercles, and the large tuberculate seeds. Four of the species resemble each other in having a short, fleshy, top-shaped stem and a flat-topped rosette of thick, fleshy, wrinkled, grey-green, wart-like tubercles. A fifth, previously included in *Echinocactus*, and later made into a distinct genus, *Lophophora*, is the "Dumpling Cactus," *A. Williamsii*. This differs from the other four in having a short, carrot-shaped, wrinkled stem, crowned with a cap-like, fleshy, grey-green top, with radiating creases and bearing a few small scattered tufts of wool'y hairs, and a central tuft from which the flowers spring. Still another generic name, *Ariocarpus*, has been proposed for these plants. For practical, purposes, however, *Anhalonium* may stand. The genus is strictly Mexican.

A. Engelmanni.

This was previously known as *Mamillaria fissurata* and *Anhalonium fissuratum*. Stem top-shaped, with thick woody roots, tubercles broad, flat, wrinkled, spreading like leaves, forming a rosette 4 inches across. Flowers rose-coloured, 1½ inch wide. Mexico. Differs from the other cultivated species in having the upper surface of the tubercle marked with a broad and deep wool-bearing longitudinal groove which widens below. (Fig. 6.)

A. furfuraceum.

Like *A. prismaticum* this differs chiefly in having shorter and more pointed tubercles, the surface of which is irregularly mamillate, and the apex a cup-like depression containing the little cushion of hairs. Flowers 1 inch long, white or pinkish, the sepals brownish.

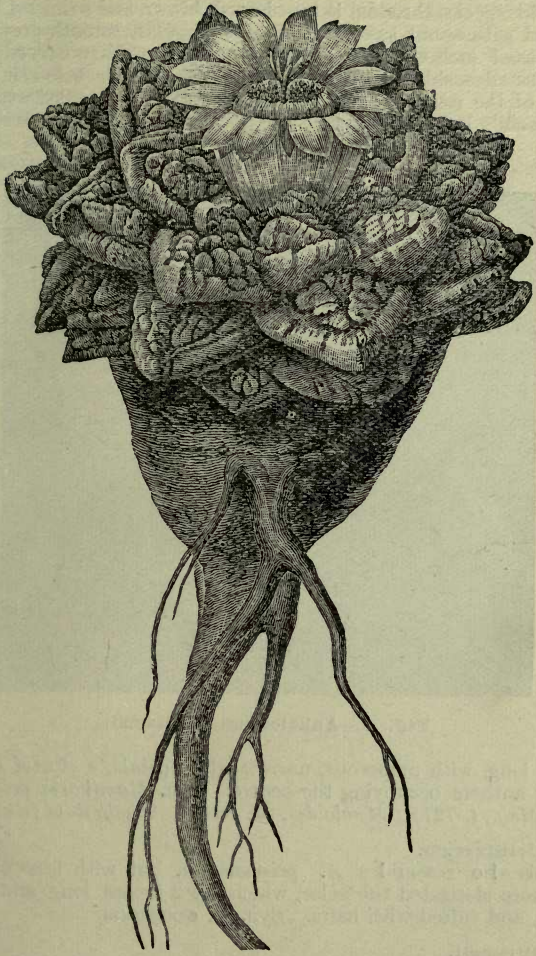

Fig. 6.—Anhalonium Engelmanni.

A. prismaticum.

In this species the stem is top-shaped, brown and wrinkled below, crowned with about twenty swollen, triangular, smooth grey-green tubercles, 1 inch wide at the base, the apex a sharp curved point, with a small cushion-like tuft of hairs immediately below it. The centre of the rosette, formed by these tubercles is filled with soft, short woolly hairs, from which the flowers spring ; they are erect, 2

Fig. 7.—Anhalonium Williamsii.

inches long, with numerous, narrow white petals, a cluster of deep yellow anthers occupying the centre. Syn. *Mamillaria prismatica* (*Bot. Mag., t.* 7279), *M. aloides, M. retusa, Anhalonium retusum.*

A. pulvilligerum.

This also resembles *A. prismaticum*, but with less crowded and more elongated tubercles, which are 2 inches long and 1 inch broad, and tufted with hairs. Syn. *A. elongatum.*

A. Williamsii.

In this we have a very distinct species (Fig. 7), known as the "Dumpling Cactus," from the puffed-out, tumid appearance of its stems, which frequently branch at the base, so as to

form a tuft of several heads; these are turbinate, 3 or 4 inches high, and 2 inches wide, smooth, pale green, divided into about half a dozen rounded sections, suggesting a number of small green potatoes joined by their bases. Each section bears several tufts of short hairs. The flowers proceed from near the centre of the crown, and are daisy-like, 1 inch wide, white, tinged with rose, developed in summer. Mexico, 1845. The stems of this plant are its most distinctive feature. It thrives on a shelf in a warm greenhouse, if kept perfectly dry in winter. Either the plant shown at Fig. 7 or a form of it, named *A. Lewini*, is said to possess extraordinary medicinal and intoxicating properties. It is known in Mexico as "Dry Whisky" and "Mescal Buttons." The Indians have long regarded it as a panacea in medicine, a source of inspiration, and the key to the glories of another world. They consider it particularly effective in hæmorrhage and consumptive diseases. It is also a powerful stimulant. See *Gardener's Chronicle*, 1896, XX., 268; and *Contemporary Review*, January, 1898, pp. 130. 141. (Bot. Mag. 9276.)

Chapter V.

EPIPHYLLUM.

Epiphyllum truncatum (Crab Cactus) was introduced here from Brazil in 1818, when it was called *Cactus Epiphyllum*; the name Cactus being used then in a generic sense. Numerous varieties of it have originated in English gardens. It grows on the trunks and branches of large trees, and occasionally on the ground, up to an elevation of 6,000 feet in the Organ Mountains. *E. Russellianum* was introduced in 1839, and first flowered in the Duke of Bedford's garden, at Woburn. *E. Gaertneri*, introduced in 1884, is the sturdiest of the three, and it has tufts of brown hairs at the bases of the flowers, which are starshaped and coloured bright scarlet.

Epiphyllums are distinguished from other genera by their flattened, long, slender green, leaf-like branchlets, growing out of the ends of each other, like the segments of crab's claws, to a length of several feet. The stems become woody and almost cylindrical with age, the axes of the branchlets swell out, and the edges either disappear or remain attached, like a pair of wings.

Cultivation.

Epiphyllums require the temperature of an intermediate house, where they can be kept moderately close and moist, and shaded from bright sunshine. Some growers recommend the conditions of a hot, dry house; but we have never seen good specimens grown in this way. In summer the plants should be syringed morning and evening; by the end of August they will have completed their growth, and should then be gradually exposed to sunshine and air, discontinuing the use of the syringe, but the plants should always be kept supplied with a little moisture at the root and in the air about them during the winter months. The soil most suitable for them is a mixture of peat, loam, and sand, with the addition of a little rotted manure They do not require much root-room, but if too small pots are used, the head of the plant is apt to overbalance it. The stems should be secured to stakes, and, if large specimens are wanted, a wire frame should be made in the form of an umbrella, and the stem and branches fastened to it. Smaller plants may be kept in position by means of a single upright stake, which should be long enough to stand an inch or two above the head of the plant, so that the stoutest branches may be supported from it. In the remarks upon grafting mention is made of the large specimens of

Epiphyllum which are grown for exhibition purposes ; and, although these plants are much rarer at exhibitions now than they were formerly yet they do sometimes appear, especially in the provinces.

It would not be easy to find a more beautiful plant during winter than an Epiphyllum, 5 or 6 feet high, and about the same in width at the base, forming a dense pyramid of drooping, strap-like branches bearing several hundreds of bright-coloured blossoms all at one time. Such plants may be grown by any amateur who possesses a warm greenhouse ; and, although it is not easy to manage such large plants in a room window, handsome specimens may be grown if the window is favourably situated and the room kept warm in winter. Mr. Wallis, of Ipswich, one of the most successful cultivators of Epiphyllums, wrote of them as follows :

"The Epiphyllums here are grown for flowering in the conservatory, and are usually gay from the first week in November till February. During the remainder of the year, they occupy a three-quarter span-roof house, in which an intermediate temperature is maintained. All our plants are grafted on *Pereskia aculeata*. We graft a few at intervals of two or three years, so that if any of the older plants become sickly or shabby, they can be thrown away. Some of the stocks are worked to form pyramids, and some to form standards. The height of the pyramids is 6 feet, and, to form these, six or eight scions are inserted. The heads of the standards are on stems ranging in height from 4½ feet down to 1½ feet. To form these heads, only one scion is put on the stock. Some of our oldest pyramids are 2 or 5 feet through at the base, and the heads of the standards quite as much. When in flower, the heads of the latter droop almost to the pots. The pyramids occupy No. 2 and No. 4 sized pots, the standards 8's and 12's. Each plant is secured to a strong iron stake, with three prongs fitting the inside of the pot, and is supported to the stake by ties. After the plants are well established, they are easily managed, and go many years without repotting ; but, of course, we top-dress them annually, previously removing as much of the old soil as will come away easily. We grow these plants with plenty of ventilation on all favourable occasions, and they are seldom shaded. During active growth water is given freely, occasionally liquid manure ; they are also syringed daily. After the season's growth is completed, water is given more sparingly, and syringing is dispensed with."

Epiphyllums may be grown on their own roots if young, rooted plants are placed rather thickly round the sides of wire baskets, and suspended in a warm house. They are also employed with good effect for covering walls, which are first covered with peaty soil by means of wire netting, and then cuttings of the Epiphyllums are stuck in at intervals of about 1 foot. Large plants of Pereskia may be trained over pillars in conservatories and afterwards grafted with Epiphyllums.

E. Gærtneri.

A robust plant, with joints 2 inches to 3 inches long, 1 inch wide, grey-green, the margin purplish, and bearing tufts of black hairs in the crenatures and apex. Flowers in clusters of 2 to 4 inches at the apex of the joints, 3 inches wide, regular, composed of about twenty spreading, narrow petals, coloured orange-red, numerous stamens, and a long five-rayed stigma. Plants 1 foot high, flowers profusely in July and August. Introduced from Brazil in 1884. Syns. *E. Russellianum* var. *Gærtneri*, *Phyllocactus Gærtneri*. A variety with fewer hairs on the joints and a slight difference in the colour of the flowers has been named *E. Makoyanum*.

BICOLOR.—Tube of flower white; petals purple.
BRIDGESII.—Tube violet; petals dark purple.
COCCINEUM.—Bright scarlet, paler at the base.
CRUENTUM.—Tube purplish; petals bright scarlet.
DELICATUM.—Branches slender; flowers white, shaded with rose.
MAGNIFICUM.—Tube rosy-violet; petals red.
SALMONEUM.—Tube white; petals salmon, shaded with purple.
SPECTABILE.—Tube white; petals carmine.
TRICOLOR.—Tube salmon; petals red, centre purplish.
VIOLACEUM.—Tube white; petals carmine, margined with purple.

Chapter VI.

PHYLLOCACTUS.

THE distinguishing character of Phyllocactus is well described by the name. The difference between it and Epiphyllum is that in the former the flowers are produced along the margins of the flattened branches, whereas in the latter they are borne on the apices of the short, truncated divisions. The stem is compressed laterally, as if it had been hammered flat; the margins are notched, the flat portions being modified leaves—not properly separated from each other and from the stem. As the plant matures, they gradually wither away, the central or woody portion only remaining to form the stem. The large, showy flowers are developed from the notches. The fruit is red, fleshy and edible, that of *P. anguliger* being used in preparing a refreshing drink like lemonade.

These are perhaps the most beautiful of all Cacti, and the most useful in a garden sense. They have been cultivated in English gardens for more than 200 years; for it was in 1710 that *E. phyllanthus* first flowered in the Apothecaries' Garden at Chelsea. The majority of the kinds now in cultivation are the result of cross-breeding.

The home of the genus is the tropics of America, chiefly Mexico and Central America, where the species grow upon the trunks of gigantic forest-trees. They are therefore epiphytes in a wild state, but under cultivation they thrive best when planted in pots.

Cultivation.

The following cultural directions are furnished by a very successful grower of Phyllocacti: Their growing season is from May, or after the flowers are over, till the end of August. As soon as growth commences, the plants should be repotted, using a light, rich soil, such as a mixture of loam, peat, rotten manure, and a little sand. Small plants should have a fair shift; larger ones only into a pot which admits of a thin layer of fresh soil. The plants flower most freely when pot-bound, and it is not necessary to repot large specimens oftener than once every three years. After potting they should be placed in a sunny position in a close tropical house or frame, and be freely watered, syringing them overhead twice a day in bright weather, and for the first few days after repotting

shading them from bright sunshine. After growth is finished they should be allowed more air and all the sunlight possible. During winter little water is needed, sufficient to prevent shrivelling. Excess of moisture in winter often kills the roots and causes the plant to rot off at the collar. The lowest temperature in winter should be 50 deg.; in mild weather it might be 5 deg. higher.

The stems may be trained either in the form of a fan or as a bush. Old branches which have flowered and are shrivelling may be cut away in the spring.

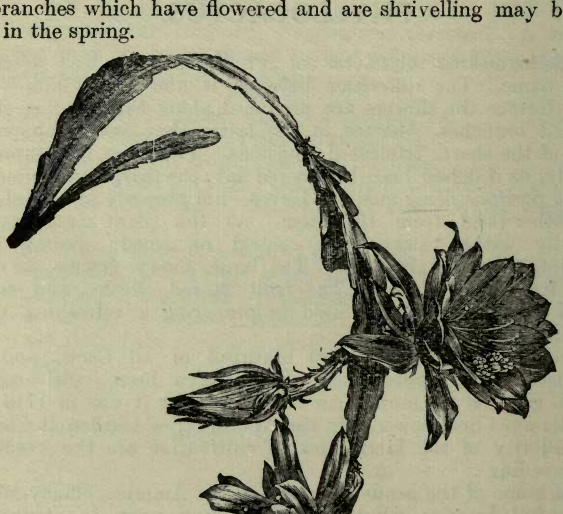

Fig. 8.—Phyllocactus Akermanni.

Fine specimen plants have been grown in pockets on walls inside lean-to greenhouses, where the conditions have been favourable to healthy growth. Good plants have also been grown planted at the foot of a sunny wall in brick rubble in a warm greenhouse.

The genus has grown largely in favour during recent years, several nurserymen having made a feature of it at exhibitions, &c. A group of about five hundred plants, showing a wide range of shades of colour and including some most lovely new seedlings, was the most attractive exhibit at the great show of the Royal

Horticultural Society held in the Temple Gardens in 1898. The Succulent-house at Kew also contains annually an attractive display of these plants. Many new varieties have been bred, and there are at least a hundred with distinctive names.

Propagation.

The whole plant may be divided at the base, or cuttings of the branches may be used; the latter, after having been dried by leaving their bases exposed to the air for a day or two, should be planted in small pots filled with very sandy soil, placed on a sunny shelf near the glass, and sprinkled overhead daily till rooted. Seeds, which are sometimes produced by cultivated plants, should be gathered as soon as the fleshy fruits are ripe, and sown in a pot of light, porous soil, in a warm frame or a greenhouse.

P. Akermanni.

Stem cylindrical at an early age, and clothed with little clusters of spiny hairs, branches broad, rather thin, the margins waved and notched; the flowers are 6 inches in diameter; tube 2 inches long, with a few small scales scattered over its surface; petals wavy and pointed; colour rich scarlet, with a satin-like lustre. June and July. One of the best-known, being cultivated as an ornamental greenhouse plant. Small plants, a foot high, and bearing from two to six flowers used to be supplied through Covent Garden Market to costermongers, who, owing to their large, brilliant flowers, always sold them at a good profit. A number of handsome and distinct hybrids have been raised between this and other species. As a compact-growing and free-flowering Cactus *P. Akermanni* (Fig. 8) can be specially recommended.

P. anguliger.

A species distinguished by notches on the stems like the teeth of a saw, and by its erect stiff habit. The flowers are produced near the apex of the branches; tube curved 6 inches long; the whorl of pure white petals 6 inches across; stamens, few; stigma, large, ten-rayed. The flowers (Fig. 9) are developed in December and January, and have a delicious odour. Introduced in 1837 from Mexico.

P. crenatus.

Without doubt this is a very beautiful species, rivalling in the size and fragrance of its blossoms the night-flowering *Cereus grandiflorus*. Stems about 2 feet, the upper portion only being winged margins serrated; flower tube 4 inches long, brown-green, as also are the sepals; petals 4 inches long, their points curved inwards; pale cream-coloured. The flowers are developed in June, and are very fragrant. Introduced from Honduras, in 1839. This is one of the parents of some of the best hybrids which have been raised both in this country and in America.

P. grandis.

The large, creamy-white (almond scented) flowers of this plant are like those of the night-flowering Cereus. It is very free

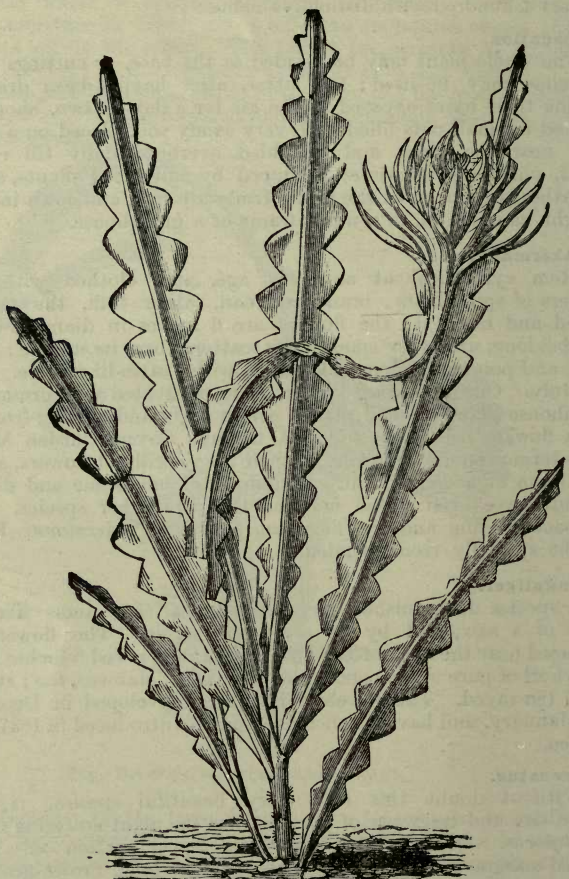

Fig. 9.—Phyllocactus anguliger.

blooming, a dozen flowers being usual on a plant in an 8-inch pot in June or July. The stems are broad, notched along the margins,

and the flowers, including the tube, are 1 foot in length, and almost as broad. Honduras. Introduced 1837.

P. Hookeri.

Robust, often attaining the dimensions of a large shrub. Stems broad, flat, deeply-notched, the serratures rounded instead of angled. Flowers sweet-scented, developed at night; tube long, no thicker than a goose quill, clothed with reddish scales; petals narrow, white, spreading, forming a cup 6 inches across; stamens bright yellow; style red and yellow. One of the first to be introduced. It flowers in summer. Brazil.

P. latifrons.

A large-growing species, like *P. Hookeri*, and may be grown to form a large shrub in a few years; or nice little pot plants may be obtained from cuttings every two years, as it flowers freely when small. A specimen 8 feet in height, well furnished with branches, is an attractive object when in flower. The wings are 4 to 5 inches broad, and deeply notched; the flowers are about 8 inches long and wide, the spreading petals creamy-white, tinged outside with red. Mexico.

P. phyllanthoides.

Discovered by Humboldt in the woods around Cartagena, in South America, and sent to France, where it flowered for the first time in 1811. The stems are broad, triangular when young, flat when old, about 1 foot long by 2 inches wide, with shallow incisions sharply angled. The height of the plant is from 2 feet to 3 feet. Flowers on the young branches composed of a thick tube, not more than 2 inches in length, and short, dark, recurved scales; petals broad, pointed, forming a stellate cluster about 4 inches across, rose-red, streaked with white, and flaked with darker red; stamens pure white. They open in the day, and are scentless.

P. phyllanthus.

This is now rarely seen in cultivation. Philip Miller grew it in 1710. The branches are broad and flat, the edges waved, not notched, and the flowers consist of a thin tortuous tube, 9 inches in length, and a whorl of recurved greenish petals, whitish stamens, and green, club-shaped stigma. Brazil.

Hybrids and Varieties.

ADONIS.—Flower large and well formed, soft pink, toned with rose.

AGATHA.—Flower large and free, rose-pink, shaded with salmon.

ALBUS SUPERBUS.—Flowers fragrant, 6 inches across, sepals greenish-white, petals pure white.

AURANTIACUS SUPERBUS.—Flowers large, brick-red, 6 inches in diameter.

CONWAY'S GIANT.—Flowers scarlet, 8 inches in diameter.

COOPERI.—Flowers large, cream-yellow.

ENA.—Rich salmon, shaded with scarlet.

EURASIAN.—Flower very large, rich scarlet, with magenta-purple margin.

FRANZI.—Flowers 4 inches across; petals scarlet, inner violet.

GENERAL GARIBALDI.—Flowers large, scarlet, tinged with orange.

GRANDIFLORUS.—Flowers bell-shaped, sepals narrow, scarlet; petals fiery orange-scarlet.

HAAGEI.—Flowers 5 inches across, carmine.

IGNESCENS.—Flowers 8 inches across, scarlet.

ISABEL WATSON.—Flower very large and well formed, colour like *Cereus speciosissimus*.

JENKINSONI.—Flowers medium, cherry-red.

JOHNSTONEI.—Flowers large, with broad scarlet petals.

KAUFMANNI.—Flowers large, purplish-red.

KERMESINA MAGNUS.—Flowers 10 inches across; petals vivid orange; sepals blood-red.

LA BELLE.—Flower large, pure white.

NIOBE.—Deep scarlet, with rich, purplish centre.

PFERSDORFFI.—Flowers 8 inches across, fragrant; petals white; sepals yellow, brownish outside.

REMPLERI.—Stems three-angled; petals long, salmon-red.

ROSEUS GRANDIFLORUS.—Flowers 6 inches long and broad, white.

SCHLIMII.—Branches three-angled; flowers large, bright purple, tinged with scarlet.

SPLENDENS.—Flowers 8 inches across, purplish-pink.

SYREN.—Petals broad, rose-pink, tinted with red.

WRAYI.—Flowers 8 inches in diameter; brown outside, yellow inside; fragrant.

Photo by] **Night-flowering Cactus (Cereus triangularis).** *[C. P. Raffill.*

Chapter VII.

CEREUS.

THERE are over 200 distinct species of Cereus distributed over the tropical and temperate regions of America. In Mexico, *C. giganteus* rears its tall, straight, columnar stems to a height of 60 feet, branching near the top, "like petrified giants stretching out their arms in speechless pain, whilst others stand like lonely sentinels keeping their dreary watch on the edge of precipices." Some of them grow near the snow-line in exposed situations on the highest mountains. In the West Indies the night-flowering species are common, their long, creeping stems clinging by means of aerial roots to rocks, or to the exposed trunks of trees, where their large, fragrant flowers are produced in great abundance, expanding only after the sun has set. Between these three types there is great variety in size and form of stem. A good number of the specie are represented in gardens, among them being many that may be cultivated with success in an ordinary greenhouse or stove. As treated here Cereus includes the plants which are called Echinocereus by some authorities.

NIGHT-FLOWERING SPECIES.

The climbing species of Cereus have the remarkable habit of expanding their flowers in the dark. Other species which are not climbers have the same habit. Their stems, which are either round or angled, grow to a length of many feet, branching freely as they extend. By means of their aerial roots they attach themselves to rocks or trees in the same way as ivy does, and soon spread over a large space; they are, therefore, useful for training over the back walls in lean-to houses, or against rafters or pillars—exposed to bright sunlight and where there is a good circulation of air. Soil does not appear to matter; where there is a little brick rubble, gravel, or even cinders they will grow luxuriantly and produce flowers in abundance. The chief consideration is drainage, without which the roots are liable to rot. The stems should be syringed morning and evening on all bright days in summer, but in winter little or no water is required.

These plants may be propagated from branches placed in porous soil, which will strike root in a few weeks. A very large example

of the noble *C. triangularis* which had suddenly rotted at the base was saved by placing a mound of brick rubble and soil high enough to surround the base of the plant above the rotted part. In a few weeks there was a good crop of new roots formed, and the plant afterwards grew most satisfactorily. These plants are singularly tenacious of life, the largest and oldest stems, if treated as cuttings, being capable of forming new roots freely.

C. Childsii.

This is described as a pink-flowered, night-blooming Cereus, of stout upright growth, with four large ribs (angles). Flowers composed of six rows of petals, which are recurved, the innumerable stamens standing well above them. The entire flower measures 30 inches in circumference, and is very fragrant. May be a form of *C. variabilis*, the flowers of which are, however, white.

C. extensus.

This has long stems, bluntly triangular, less than 1 inch thick, with very short spines, arranged in pairs or threes, about 1 inch apart along the angles. The flowers are developed from the mature stems, and have a thick, green, scaly tube, about 3 inch long, and a cup about 9 inches across, formed of the long-pointed sepals and petals, the former yellow, green, and red, the latter white, tinted with rose. Trinidad, 1843.

C. fulgidus.

In its orange-scarlet flowers, this stands alone among night-flowering kinds. It is a hybrid between a Phyllocactus and a climbing Cereus, and first flowered at Kew in July, 1870. The stems are bright green, three or four-angled, about 2 inches thick; margins notched, with clusters of short, hair-like spines at each notch. Flowers 6 inches long, and about the same in width; tube covered with soft hairs and short deep-red scales, which, along with the petals, form a large rosette like a semi-double rose, with a brush-like cluster of greenish stamens.

C. grandiflorus.

A magnificent climber. A strong plant will produce dozens of flowers together, opening in the evening, and fading the next morning. The closing of the flower may be retarded by removing it before it is fully open and placing it in water. The stems are almost cylindrical, with four to seven angles, which bear numerous tufts of wool and short stiff spines. The flowers are developed in July on the sides of the younger, short stems; tube about 4 inches long by 1 inch in diameter, covered with short brown scales and whitish hairs; sepals narrow, bright yellow inside, brown outside; petals broad, pure white, arranged to form a cup a foot in diameter, enclosing the numerous yellow stamens and the club-

shaped stigma. The flower has a delicious vanilla-like odour. Introduced from the West Indies in 1700 and first flowered at Hampton Court.

C. kewensis.

A hybrid raised at Kew from *C. Macdonaldiæ* and *C. nycticalus*. Stems up to 12 feet in length and an inch in diameter, serpentine, with three to five ribs and a few short spines. Flowers about a foot long and wide, the tube clothed with fleshy purplish scales; sepals brownish-yellow; petals white; style and stamens yellow. They expand at dusk and close at dawn and are slightly fragrant.

C. Lemairei.

In size, fragrance, and brilliancy of colour this species resembles *C. grandiflorus*, but the tube is covered with large green, crimson-edged scales; the sepals do not spread out star-like, and they are tinged with crimson; the stem is triangular, and the angles bear distant spines instead of clusters. It was introduced into England through Kew, in 1854, from the Botanical Garden of Hanover. It blossoms in June, the flowers remaining open for several hours after sunrise.

C. Macdonaldiæ.

A magnificent Cactus, its flowers being over a foot in diameter. Stems slender, cylindrical, not angled, bearing at irregular intervals rather fleshy tubercles instead of spines, and branching freely. The flowers are produced on both young and old stems in summer. The stems being pliant, they may be trained round a balloon trellis. Writing of this plant, Sir Wm. Hooker said: "Certainly, of the many floral spectacles that have gratified lovers of horticulture at the Royal Gardens, Kew, of late years, few have been more striking than this to those who were privileged to see the blossoms in bud and fully expanded. The plant was received from Honduras through the favour of Mrs. MacDonald, and was planted at the back of the old Cactus-house, and trained against a wall. It first showed symptoms of blossoming in July, 1851. A casual observer might have passed the plant as an unusually large form of the 'night-blowing Cereus' (*C. grandiflorus*), but the slightest inspection of the stems and flowers, the latter 14 inches in diameter by 14 inches long, shows this to be a most distinct species."

C. Napoleonis.

Like *C. grandiflorus*, but the flowers sometimes open early in the morning and fade in the afternoon. The tube is 6 inches long, curved and clothed with rose-tinted scales, which become gradually larger towards the top, where they widen out into a whorl of greenish-yellow sepals, above which are the white petals forming a broad shallow cup, 8 inches across, with a cluster of yellow stamens in the

centre. The stems are three-angled, light green, and bear clusters of short stiff spines along the angles at intervals of 2 inches. Flowers in autumn. Mexico.

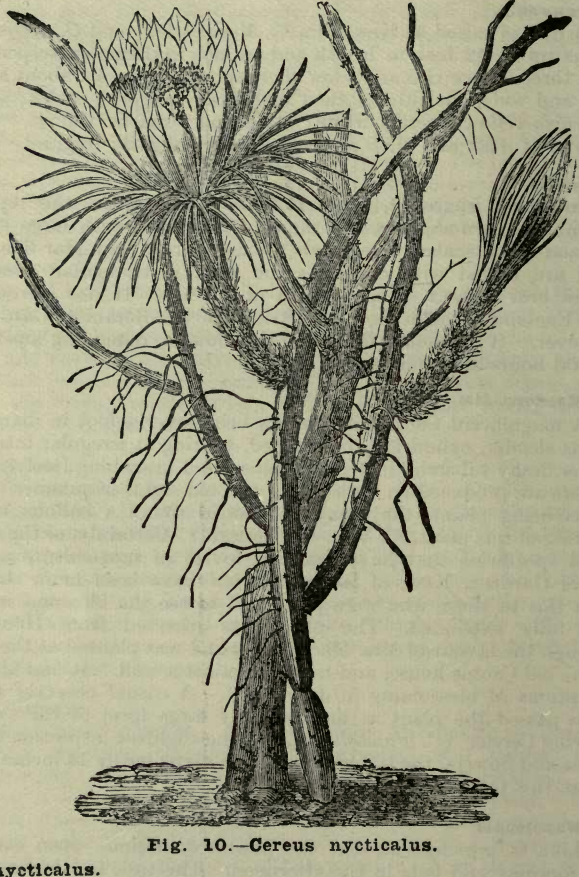

Fig. 10.—Cereus nycticalus.

C. nycticalus.

The stems of this species (Fig. 10) are 2 inches thick, angular, bearing little tufts of hair and thin white spines along the angles, and a profusion of aerial roots. Flowers as large as those of *C. grandiflorus*; tube covered with tufts of white hairs; sepals bright orange;

petals pure white, arranged like a cup. They open at about seven o'clock in the evening, and fade the following morning. This species was formerly cultivated in almost every collection of stove plants, and its flowering in the autumn was looked upon as an event, it being customary for the owner to invite his friends to meet and watch the development of the flowers and enjoy their delicious fragrance. Mexico, 1834.

C. speciosissimus.

Although neither night-flowering nor a climber, this species may be included here, as it has fairly long angular stems, grows quickly, and flowers freely; also it may be grown satisfactorily as a wall plant. When well grown and flowered it is magnificent. Specimens with thirty stems each 6 feet high, and bearing from sixty to eighty buds and flowers upon them at one time have been grown in this country. The stems are three to five angled, with tufts of spines set in little disks of whitish wool. The flowers are 6 inches across; tube 4 inches long; their colour is an intense crimson and violet, so bright as to dazzle the eyes when looked at in bright sunlight. April and May. Mexico, 1820. It is said to have been crossed with other species of Cereus, also with Phyllocactus. Sir E. Antrobus is said to have exhibited specimens with from 200 to 300 flowers each, and a large plant of it grown on the back wall of a vinery at the Grange, Barnet, produced hundreds of flowers every year.

C. triangularis.

This is easily recognised by its stout triangular stems. The flowers measure 1 foot in length by about the same in width, and are composed of a whorl of long narrow green sepals, with pale brown points, a cluster of pure white petals, bright yellow stamens, and a large club-like stigma; they develop in autumn. Mexico. Flowered at Hampton Court in 1690.

TRAILING SPECIES.

These have thin, drooping or trailing stems. Some botanists have made a separate genus for them, viz., Cleistocactus, but for practical purposes they may be grouped under Cereus. Two of them (*C. flagelliformis* and *C. Mallisoni*) are often grafted on the stem of an erect Pereskia or on a climbing Cereus, such as *C. triangularis*, in such a way as to hang from the roof of a house. A large specimen of *C. flagelliformis*, growing from the climbing stem of *C. rostratus*, was for a long time conspicuous in the Cactus-house at Kew.

C. flagelliformis.

Stems prostrate or pendent, $\frac{1}{2}$ inch in diameter, round, with numerous ridges almost hidden by many clusters of fine bristle-like

hairs. Flowers 2 inches long and 1 inch wide, rosy-red. In some parts of the Continent this plant is one of the commonest of window ornaments, and it is so well grown that the whole window space is sometimes completely screened by the numerous long, tail-like stems (Fig. 11), 4 to 6 feet long, hanging from a basket. It is sometimes grown by cottagers in England. The plant, even when not in

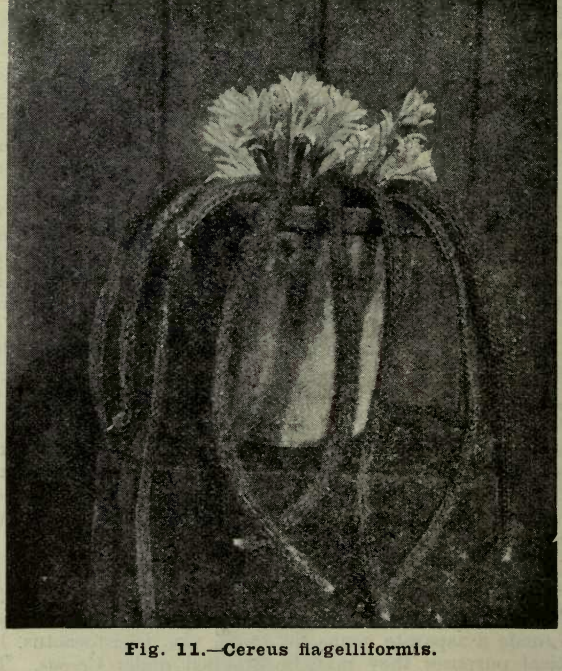

Fig. 11.—Cereus flagelliformis.

flower, has the charm of novelty in its stems, and as it is easily cultivated in a sunny window, it is just the plant to grow for the double purpose of a screen and a curiosity. If planted in baskets, it should be potted in a porous loamy soil, and kept moist in the summer and perfectly dry in winter. Peru. Introduced 1830.

C. Mallisoni.

Supposed to be a hybrid, Mr. Mallison having sent it to Dr. Lindley to be named, and stated that he obtained it by crossing *C. speciosissimus* with *C. flagelliformis*. Whatever its origin, it is a

distinct kind, with stems similar to those of the last-named, but thicker and slightly less spiny, and flowers 4 inches wide, bright red, with pale yellow stamens. They are produced in abundance, a large specimen making a very attractive display for several weeks in the summer.

C. serpentinus.

The stems of this plant (Fig. 12) are at first erect and stout enough to support themselves; but as they lengthen they fall over and grow along the ground; they have numerous ridges, with clusters of hair-like spines, which are usually purplish. Flowers large,

Fig. 12.—Cereus serpentinus.

handsome, fragrant; tube 6 inches long, green; petals and sepals spreading and forming a star 3 inches in diameter, the petals purplish on the outside, and pinkish-white inside. Small specimens are ornamental even when not in flower, the bright green, sinuous striate stem, with little clusters of fine spines, and short tufts of white wool, being both curious and pretty. It flowers freely in summer. South America, 1814.

GLOBOSE AND COLUMNAR-STEMMED SPECIES.

C. aggregatus.

Stems egg-shaped, 2 inches to 4 inches high, occurring wild in dense cæspitose masses of from 100 to 200 stems "like a bushel

basket." Ribs eight to eleven, the spine-cushions closely set; spines thin, straight, white or grey ½ inch long. Flowers deep crimson, 1 to 2½ inches long. Mexico. Syn., *C. phœniceus*, *Echinocere s phœnice s*. A variety called *inermis*, introduced from Colorado in 1896, differs in having no spines.

C. Berlandieri.

A beautiful dwarf plant (Fig. 13), of creeping habit, forming a tuft of short, rather soft and watery stems 6 inches in length by ¾ inch

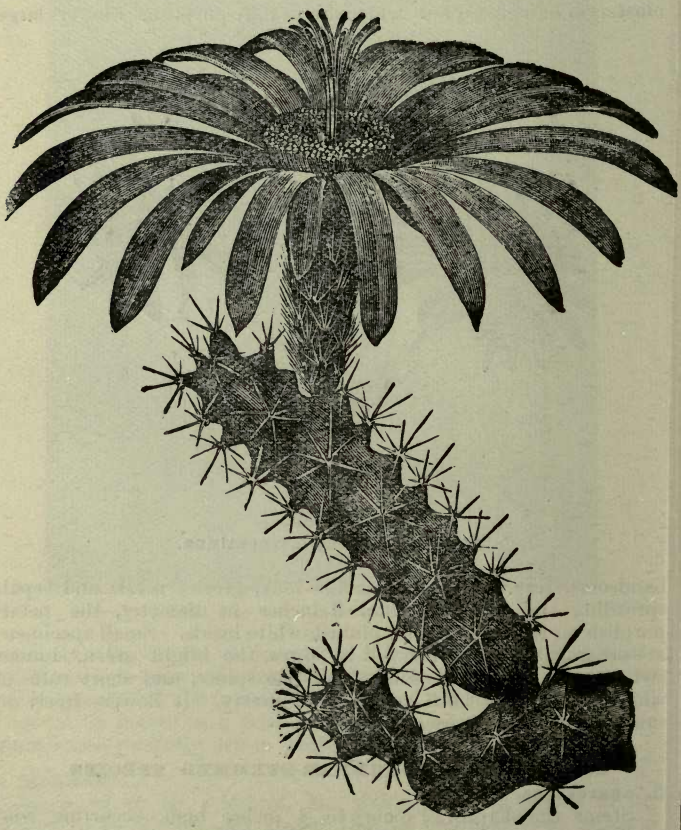

Fig. 13.—Cereus Berlandieri.

in thickness, bearing on the ridges little tubercles crowned with short spines. Flowers 4 inches across, composed of a regular whorl of strap-shaped, bright purple petals, an erect bristly tube, and a disk-like cluster of rose-coloured stamens, the stigma standing well above them. Native of South Texas and Mexico, growing on dry, sunny hillsides. It thrives in a cool greenhouse or frame where it can get plenty of sunshine. In winter it should be placed close to the glass safe from frost. Also known as *C. repens* and *C. Deppii*.

C. Blankii.

Differs from *C. Berlandieri* in having longer, broader, less spreading petals, a club-shaped stigma, and in the colour, which is a deep rose, flushed in the throat with crimson. It is very common in Continental gardens, where it is grown out-of-doors, being protected from cold in winter by a handlight and straw. It flowers in summer.

C. cærulescens.

An erect, tall Cactus, rarely branching unless made to do so by cutting off the top of the stem; ridges prominent, waved, and bearing tufts of blackish wool, in which are set about a dozen black spines, half an inch long; when young the stem is bluish in colour. Flowers springing from the ridges, about 8 inches long, the tube

Fig. 14.—Cereus cæspitosus.

covered with red-green scales, which change upwards into sepals; petals spreading, white, the margins toothed, and forming a spreading cup, not unlike a large white single Camellia. It is too tall-stemmed to be recommended for windows or small greenhouses; but where room can be afforded it, the attractive colour of its

stems, together with the size and beauty of its flowers, should win it favour for the conservatory. It blossoms in July. Mexico.

C. cæspitosus.

Stems 8 inches high by about 4 inches in diameter, in clusters. The greyish-green ribs, of which there are from a dozen to eighteen, covered with tufts of whitish wool and rose-tinted

Fig. 15. Cereus enneacanthus.

spines. Flowers produced on the top of the stems (Fig. 14), the short tube clothed with spines; spread of the petals 4 inches, deep rose; anthers yellow; stigma bright green. New Mexico and Texas. Suitable for windows or small greenhouses, as it flowers freely and keeps in good health in an ordinary temperature, if

placed upon a shelf near the glass from October to March, keeping it dry, till early in summer.

C. cirrhiferus.

Stems prostrate, small, very proliferous, rooting freely; branchlets upright, five-angled, with slightly raised tubercles, upon which are ten short hair-like spines, arranged in a star, and surrounding three or four central erect spines, all whitish and transparent. Flowers large, bright red, nearly 4 inches in diameter, regular as a Sunflower, and lasting about a week. Introduced from Mexico in 1847. It requires similar treatment to *C. Berlandieri*.

C. enneacanthus.

Stems about 6 inches high by 2 inches in diameter, cylindrical, bright green, clustered in old specimens. Ribs shallow; spines straight, yellowish, longest about 1 inch. Flowers borne in June near the top of the stem (Fig. 15), petals deep purple; stamens yellow. It should be grown in a sunny position as near to the roof-glass as is possible. Texas.

C. Eruca.

Stem prostrate, rarely branched, 1 foot to 3 feet long, 3 inches to 6 inches in diameter. Ribs thirteen to twenty-one, with closely-set spine tufts; spines stout, straight, the radials terete nearly 1 inch long, the centrals thicker, angled or flattened, one wide one in each tuft pointing downwards. Flowers 4 to 6 inches long, yellow. "A plant of very curious and uncouth habit, creeping over and accommodating itself to every obstacle, often in large masses, covering many square yards. The manner of growth, with uplifted heads and prominent reflexed spines, gives the plant a resemblance to huge caterpillars." California.

C. Fendleri.

One of the best. Stems pale green, about 6 inches high, rarely branching, often in clusters. Ridges running spirally round the stem; spines brown, an inch or more in length; flower tube 1 inch long, green, spiny; petals and sepals forming a cup 3 inches in diameter, bright purple; stigma and anthers green. It flowers in June. New Mexico. Can be grown in a sunny sheltered position out of doors, and is one of the showiest of the hardier species.

C. giganteus.

The giant of the family. It grows very slowly, a plant 6 inches high being ten years old. It flowers when 12 feet high, but grows four or five times that height, when it develops lateral branches, which curve upwards. Large imported stems of it have been seen at Kew, but they do not live long under cultivation. Native of Mexico and California.

C. Leeanus.

Stems not more than 1 foot high, and about 5 inches in diameter, conical in outline, with about a dozen ridges, clothed with clusters of pale brown spines, the central one an inch long, the others much shorter. The flowers are produced in June or July on the top of the stem, four or five together, and are brick-red in colour, the tube 2 inches long, with yellowish, green-tipped scales and clusters of hair-like bristles. Introduced in 1848 from Mexico, it has been known to bear a little frost without injury.

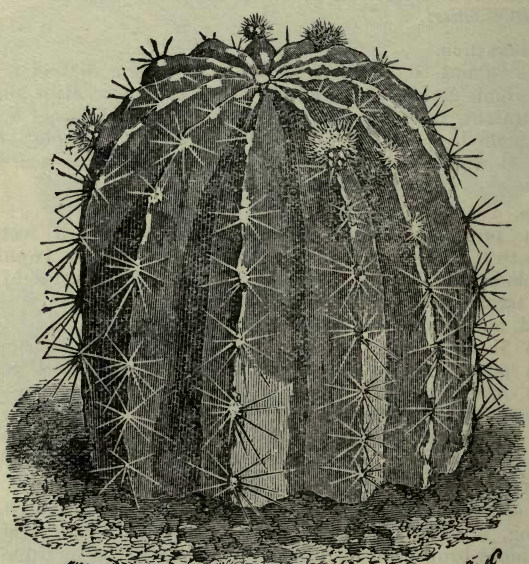

Fig. 16.—Cereus multiplex.

C. leptacanthus.

One of the most beautiful and one of the easiest to cultivate. In habit it is similar to *C. Berlandieri*, the short, creeping stems being crowded, and flowering freely in May and June. The notched petals are deep purple-lilac on the upper half, the lower part being white, as also are the stamens ; anthers and stigma orange-coloured. Mexico, 1860. Not much grown in English gardens, though common in Continental collections

C. multiplex.

A globose or pear-shaped species (Fig. 16), 6 inches high by 4 inches in diameter; ridges clothed with clusters of spines, the central one longest. Flowers 6 inches to 8 inches long, and about the same across the spreading petals; tube clothed with small, hairy scales; sepals long and pointed; petals 1 inch wide, spreading; stamens in a ring round the whitish-rayed stigma. It flowers in autumn if grown in a warm, sunny position under glass or in a room window. South Brazil. A form of it named *cristatus* has the stem curiously divided after the manner of a cockscomb. So far as is known, neither this nor any other of the "monster" Cactuses produce flowers.

C. paucispinus.

A dwarf species, the stem being about 9 inches high, by 4 inches in diameter, the ridges irregular, thick and lumpy, giving the plant a gouty appearance. Spines, pale brown in tufts of about eight, the longest nearly 2 inches. Flowers developed two or three together in May near the top of the stem; tube 2 inches long, clothed with spines and green scales; petals 2 inches long, rounded at the tips, and coloured deep blood-red, tinged with orange inside. Stamens in a compact cluster. New Mexico, 1883. Can be grown in a cool frame or even in the open in a sheltered, sunny nook if kept quite dry during winter.

C. pecten-aboriginum.

Stems erect, solitary, ultimately becoming 25 feet high, and 1 foot in diameter, with erect branches. Ribs ten, of a purplish hue, clothed with closely-set tufts of hairs and about ten spines, which are stout, straight, about 1 inch long, radial, with one or two central ones, ash-coloured. Flowers white, 2 to 3 inches long. Fruit globose covered with yellow spines, and forming balls 3 inches in diameter. The Indians grind the seed to mix with meal, and use the bristly covering of the fruit as a hairbrush. Mexico and Lower California. (Fig. 17.)

C. pectinatus.

Described as having four or five flowers open at once on a single stem, and a cluster of stems with seventy or more flowers, each 3 inches across, bright purple, and very fragrant. It may be grafted on to short pieces of *Cereus grandiflorus*. Several varieties have been described, viz.: *rigidissimus*, remarkable for its stout, rigid, variegated, radial spines, and the absence of central ones; *robustus*, 1 foot high, with reddish spines and bright rose-red flowers, the lower part of the petals white. Mexico.

C. pentalophus.

Stem slender, erect, with five prominent ridges, along which are little clusters of small spines about ½ inch apart. The flowers

are 3 inches wide, spreading, the petals broad and over-lapping, rose-coloured, except in the centre of the flower, where they are almost white; anthers yellow; stigma purple. Mexico, 1838. During summer it may be placed in a sunny position in a frame out of doors if placed indoors for the winter.

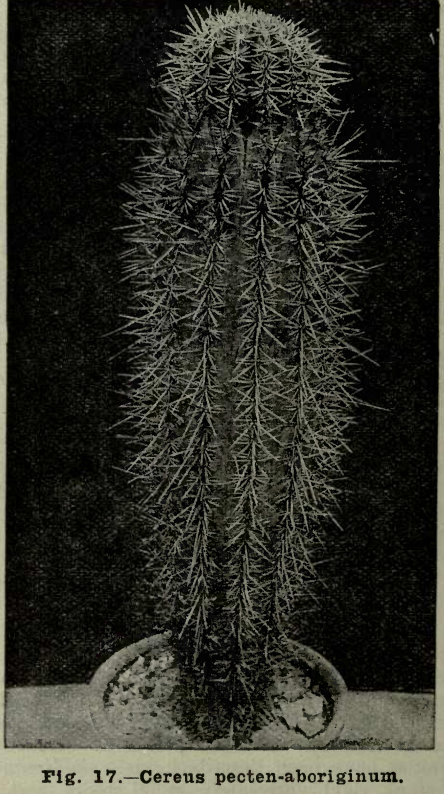

Fig. 17.—Cereus pecten-aboriginum.

C. peruvianus.

Stems sometimes 12 feet or more high, and very spiny. Ridges from five to eight, with stellate bundles, about 1 inch apart, of small, stiff black spines. Flowers 5 inches across, white above tinged with red below. They are rarely produced in cultivation

as small examples do not flower. The species is often to be seen in large conservatories, as it is easily kept in health. There are fine examples of it at Kew. A variety, with fasciated stem, is sometimes cultivated. Peru. 1830.

Fig. 18.- Cereus procumbens.

C. polyacanthus.

Stem 10 inches long, 2 to 4 inches wide, pale green or glaucous, with about eight ridges; spines in clusters of half a dozen or so,

about ½ inch apart. Flowers 3 inches long; tube spiny; petals blood-red, concave, rounded at the tip, forming a shallow cup. Exceptional in the length of time its flowers last when they develop in May. It may be grown in a cool greenhouse, frame, or room window, as it requires only to be protected from frost. Mexico, about 1890.

C. Pringlei.

Stem stouter than but not so high as that of *C. giganteus*, with branches starting about 2 feet from the ground. The tallest stems are described as about 50 feet high and 4 feet in diameter, but the average is about half that height. Ribs about a dozen, along which there is almost a continuous line of spine tufts; the spines small, and mixed with ash-coloured hairs, except on old parts of the stem, where the spines are flat, from 1 to 2 inches long, and there are few or no hairs mixed with them. Flowers scattered along the ribs below the top, white, tinged with green or purple, 3 inches long. Lower California, "covering the ground almost entirely for miles."

C. procumbens.

Stems spreading prostrate, with upright branches 4 inches long, ½ inch thick, four-angled, with small spines in tufts along the angles. Flowers 3 inches long and wide, the petals spreading and recurved, daisy-like; bright rose purple; produced in May and June. Requires cool treatment with plenty of summer sunshine and complete drought and protection from frost in winter. Mexico. (Fig. 18)

C. repandus.

Stem erect, 10 feet or more high. Ribs eight or nine in number, undulated, and bearing tufts nearly 1 inch apart, of about ten stiff brown spines set in a cushion of white wool. Flowers with a scaly tube, 4 inches long; spreading, incurved, pale brown sepals, and two rows of broad, overlapping, white petals; stamens white, with yellow anthers; stigma yellow. Requires stove treatment. (Fig. 19.)

C. Sargentianus.

Stems in clumps of eight or more, the tallest being 10 feet high. Angles five or six, forming obtuse ribs, the spine-tufts closely set and formed of about ten stout, grey, straight spines, ½ inch long, and short grey hairs. Flowers, borne only by the tallest stems, rose-coloured, with yellow anthers and white style, 1 inch long and 1 inch wide, and almost hidden by the spines, which are much longer and flexuose, and occur in larger clusters on the tallest flowering stems. Fruit smooth, red, said to be edible. Closely related to *C. Schottii*. Lower California.

C. variabilis.

Stems rather straggling and branching freely, usually four-winged, constricted as in Phyllocactus, spiny along the edges. Flowers large, showy, tube 6 inches long, smooth, fleshy, with a few scales near the top; sepals greenish, strap-shaped, pointed;

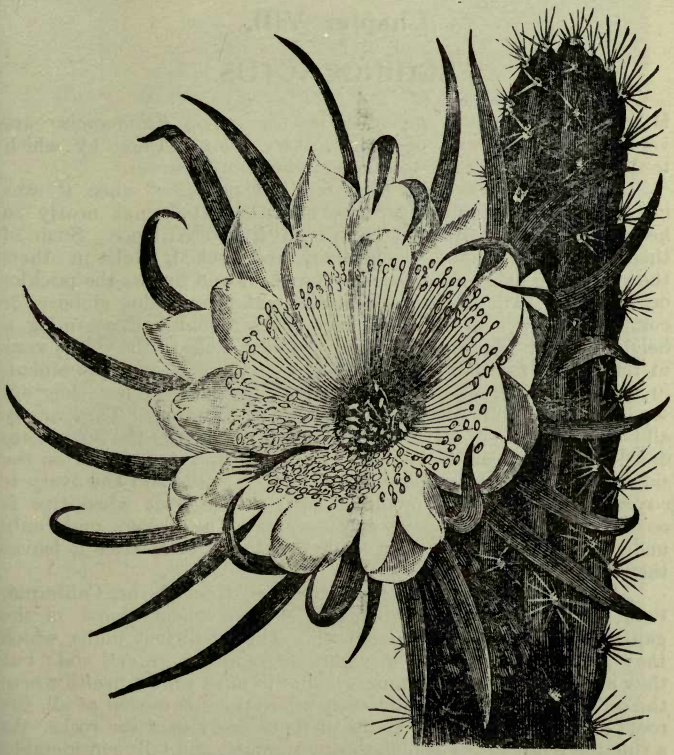

Fig. 19.—Cereus repandus.

petals spreading, with toothed margins and a long acute point, white or cream-coloured. Common in some parts of South America and the West Indies; always near the sea. Flowers in July, opening in the evening and closing before noon the following day. It requires tropical treatment. There are some old plants of it in the Kew collection, where they flower annually.

Chapter VIII.

ECHINOCACTUS.

MANY of the plants included in the genus *Echinocactus* are very similar to species of Cereus, there being nothing by which to distinguish them from each other when not in flower.

Echinocactus was first used for *E. tenuispinus* when it was introduced into English gardens in 1825. It is not nearly so hedgehog-like as many that have been discovered since. Some of them have stout spines 4 inches long, and hooked, whilst in others the spines are long and needle-like, or short and fine as the prickles on a thistle. The stems vary in size and form, being globose, or compressed, or ovate, a few only being cylindrical, attaining a height of from 5 to 10 feet. They are unbranched; the ridges vary in number from about five to fifty, in some firm and prominent, in others reduced to mere undulations, whilst in a few they are separated into numerous little tubercles or mammæ. They nearly all have spines clustered along the ridges. Generally the flowers are developed from near the centre of the top of the stem, never on the side as in Cereus; they are about as long as wide, and the ovary is covered with scales or modified sepals. The fruit when ripe is covered with the persistent calyx scales. The flowers open only under the influence of bright sunlight, closing soon after it leaves them.

About 200 species have been described from Texas, California, Peru, Brazil, Chili, and particularly Mexico, whence most of the garden kinds have been introduced. The conditions under which they grow naturally vary in regard to temperature and soil; but they are found in greatest numbers and in most robust health where the soil is loose or sandy, and even where there is no soil at all, the roots finding nourishment in the clefts or crevices of the rocks. As a rule the temperature is high during summer, and falls considerably in winter, some growing even where frost and snow occur; the majority of them require stove treatment.

Few of the species of Echinocactus known to botanists are represented in garden collections, though not one would be considered unworthy. Their flowers are large and bright coloured; and there is charm in the curious, grotesque, and often beautifully symmetrical shape of their stems. *E. Visnaga* (Fig. 20) may be taken as an example of this. This is indeed one of the most

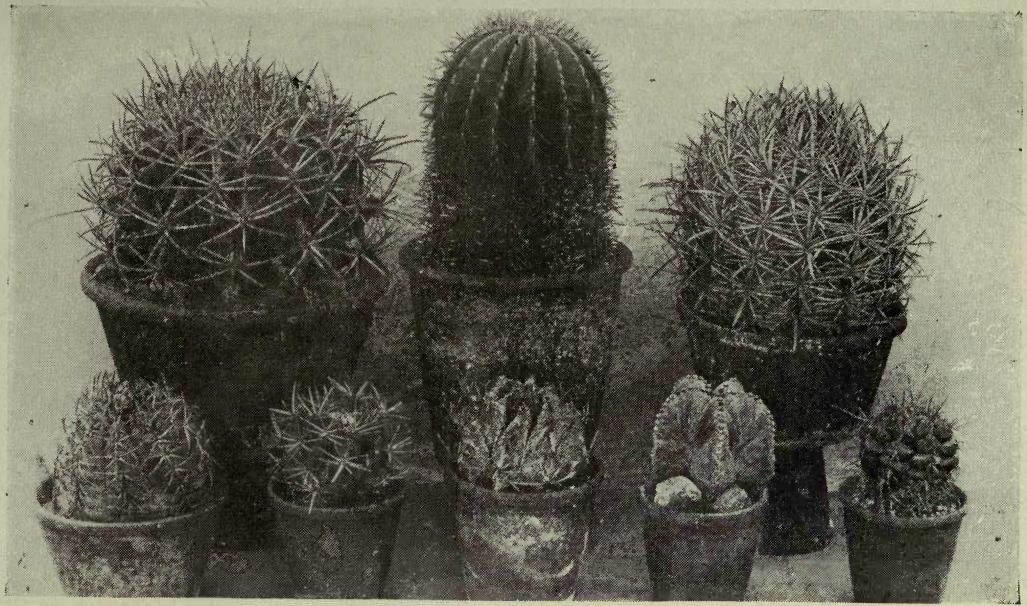

Photo by] [*C. P. Raffill.*

Group of Echinocactus.

remarkable plants known. Its spines are 3 inches long, almost as firm as steel, being used by the Mexicans as toothpicks, and they are

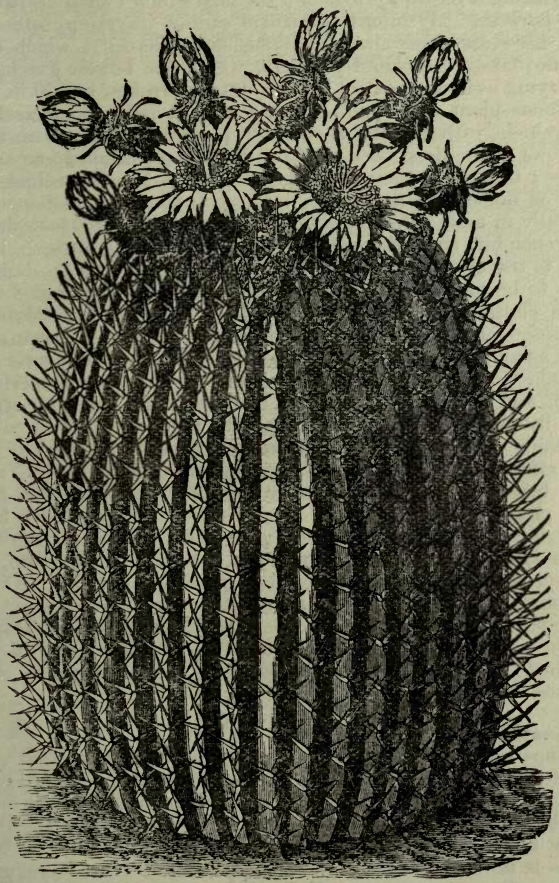

Fig. 20.—Echinocactus Visnaga.

borne in great numbers all over the massive stem. The following account of a large specimen introduced to Kew in 1845, was given by Sir Wm. Hooker in the *Gardeners' Chronicle* of that year. It

was sent by Mr. F. Staines, who wrote from San Luis Potosi: "I mean to have a large specimen of *E. Visnaga* deposited in a strong box, sending the box first to the mountain where the monsters grow, and placing it on the springs of a carriage which I shall despatch for that purpose. My monstrous friend cannot travel any other way, from his stupendous size and immense ponderosity, which cannot be adequately calculated for here, where the largest machine for conveying weights does not exceed sixteen arrobes, or 400 lb. This enormous plant will require twenty men at least to place it upon the vehicle, with the aid of such levers as our Indians can invent. It grows in the deep ravines of our loftiest mountains, among huge stones; the finest plants are inaccessible to wheeled vehicles, and even on horse-back it is difficult to reach them. I shall pack him carefully in mats before applying to his roots the crowbars destined to wrench him from his resting-place of unknown centuries. He will have to travel 300 leagues before he reaches Vera Cruz." Being too large to be packed in a box, the stem was first surrounded with a dense clothing of Old Man's Beard or Spanish Moss (*Tillandsia usneoides*) and well corded. Fifteen mats, each as large and as thick as an ordinary doormat, formed the exterior envelope. When unpacked on its arrival at Kew, the stem was seen as perfect, as green, and as uninjured as if it had been that morning removed from its native rocks, its long, rope-like roots arranged in coils like the cable of a ship. When placed in scales it weighed 713 lb., its circumference at 1 foot from the ground was 8 feet 7 inches, and its total height, 4½ feet; the number of ridges was forty-four, and on each ridge were fifty bundles of spines, four spines to each bundle. Thus there were 8,800 spines or toothpicks, enough for the supply of an army! A still larger specimen, which weighed 1 ton, was a year or so later successfully brought to Kew; but this, as well as the smaller one, survived only a short time, the fate of others which have been introduced since. The late Mr. Peacock, of Hammersmith, possessed two large plants of *E. Visnaga*, one of which weighed nearly 5 cwt., and measured 8 feet 6 inches in circumference.

Cultivation.

The soil for Echinocactus should be similar to that recommended for Cereus, as also should be the treatment with regard to sunlight and rest. It cannot be too clearly understood that between October and March these plants should be kept dry at the root, in a dry house, where the temperature would not fall below 50 deg. There is no occasion for re-potting them every year, it being quite safe to allow them to remain in the same pots for several years, provided the soil be fresh and the drainage perfect.

For some of the smaller species it is a good plan to graft them upon the stem of a suitable *Cereus* such as *C. tortuosus* or

C. colubrinus for the smaller kinds, and *C. peruvianus* for the larger. Some growers prefer to graft them all, and certainly they are safer thus treated than when on their own roots. In preparing stock and scion, they should be as near as possible of the same diameter, and cut so that their edges meet, and two or three stakes should be placed so as to afford support to the graft and hold it firmly in position.

Propagation.

The tops of the stems may be utilised for the multiplication of these plants, putting them into soil to root, and, as new shoots develop on the old stock, they may be cut away with a sharp knife and treated in a similar manner. Plants that become sickly, and look shrivelled and cankered at the base, may be reinvigorated by cutting off the healthy tops and treating them to form new roots. Seeds may sometimes be obtained from dealers, and the gradual development of the plant from the seedling stage is interesting and instructive. Seeds sown in soil and kept moist and warm germinate in about a month, when the little pea-like green balls will be seen pushing their way through the soil, increasing in size slowly, their spines also increasing in number and strength till, finally, the characters of the mature plant are developed.

E. bolansis.

Stem cylindrical, 16 inches high, 4 inches in diameter, with from eight to thirteen ribs, disposed more or less spirally. Spine tufts crowded, composed of about twenty radials, which are white, straight, and about 1 inch long, and four central, also straight, and 1½ inches long. The flower is terminal, 2 inches wide, and coloured bright red. Mexico.

E. brevihamatus.

This is one of several kinds of Echinocactus which are distinguished from the rest in having the ridges divided into tubercles, and running spirally round the stem, which is ball-like, from 4 to 6 inches high, the ridges about ½ inch deep, and upon each tubercle is a tutt of about a dozen brown, radiating spines, with a long central one hooked at the point. The pink flowers are produced in summer, three or four opening together; they are 1 inch across. South Brazil, 1850. A pretty little plant for a shelf in a greenhouse where it can get full sunshine. It grows very slowly, succeeding best when grafted on Cereus.

E. cinnabarinus.

Stem 6 inches in diameter and 4 inches high; spiral ridges divided into tubercles surmounted by tufts of strong, brown, radiating spines, embedded in a little cushion of wool. Flowers springing from the top of the stem, two or three together. Tube short and

green ; sepals long green ; petals 2 inches long, overlapping, recurved, the edges toothed, cinnabared ; stamens and anthers bright yellow. Bolivia, 1846. It blossoms in July, on a shelf in a cool greenhouse.

E. concinnus.

Stem globose, 2 inches to 4 inches wide, with about twenty ridges, which are rounded, rather broad, each bearing about

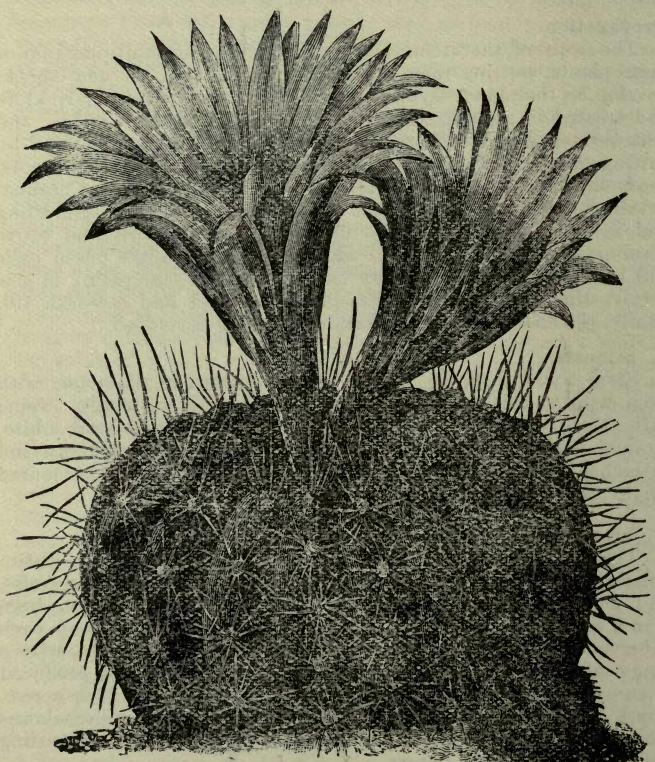

Fig. 21.—Echinocactus concinnus.

half a dozen little bunches of spines. Flowers numerous, 3 inches long and wide ; tube covered with hair-like spines, and reddish scales ; petals in several rows, overlapping, with pointed tips, dark yellow with a red streak down the centre ; stigma red.

Several flowers are sometimes developed together in summer. Mexico, 1840. Requires a warm greenhouse all the year round, and plenty of sunshine. It does well when grafted on a short stem of *Cereus Napoleonis*. (Fig. 21.)

E. cornigerus.

This extremely remarkable plant has the stoutest spines of all Cacti. The broad tongue-like central spine in each cluster is as strong as iron; as also are the three erect horn-like yellow spines. The stem is ball-shaped, grey-green, divided into from fourteen to twenty-one stout wavy ribs, upon which the spine tufts occur at intervals of about 2 inches. The flowers are small, with narrow purple petals and brown-red sepals. Requires stove treatment. Mexico and Guatemala. It has been called *Melocactus latispinus* and *Echinocactus latispinus*.

E. corynodes.

Stem about the size of an average Ribston Pippin Apple, with about a dozen and a half prominent sharp ridges, and bunches of stout yellow spines. Flowers, in a cluster on the top of the stem, forming a crown of bright yellow petals, studded with scarlet eye-like stigmas. Each flower is 2 inches in diameter. Mexico, 1837. Also known as *E. rosaceus* and *E. Sellowianus*. The whole plant, though small, is, when in flower, most charming.

E. Cummingii.

Stem globose, 3 inches in diameter, the spiral ridges divided into tubercles, each bearing a cluster of yellow hair-like spines. Flowers numerous, 1 inch long and wide, bright marigold yellow, as many as half a dozen opening together in bright sunlight in July. One of the hardiest, thriving in a frost-proof house or frame. In summer it likes plenty of moisture and sunshine. Bolivia.

E. durangensis.

Stem ovate-cylindrical, 3 inches to 10 inches high, with about twenty ribs, bearing tufts of yellowish and brown stout spines from 1 to 2 inches long, the lowest ones the stoutest and hooked, the central angled. Flowers, brownish-red. May be only a form of *E. cylindraceus*. Mexico.

E. Echidne.

Stem 12 inches by 8 inches, with about a dozen ridges, disposed spirally, and bearing tufts of rigid, broad spines, 1 inch or more long, spreading, so as to interlace and form a close network all round the stem. It may be mentioned here that an American naturalist has suggested that the purpose of spines on the stems of Cactuses is not so much to defend the plants from animals so as to afford protection from the scorching rays of the sun, which would otherwise cause them to blister and shrivel. The nature of

the spiny covering of *E. Echidne* seems to support such a view. Flowers of medium size, bright yellow, produced two or three together in summer. Mexico. It thrives in a greenhouse where frost is excluded, but rarely flowers under cultivation.

E. Emoryi.

Stem large, examples having been found 3 feet in height and and about 2 feet in diameter. Average plants have globose stems 1 foot through, with about thirteen ribs, the ribs tuberculated, the

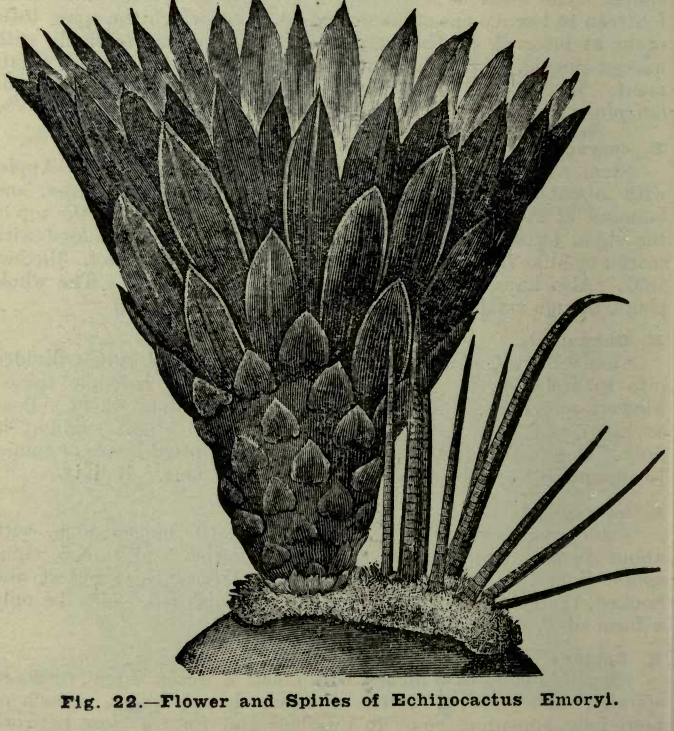

Fig. 22.—Flower and Spines of Echinocactus Emoryi.

tubercles large, and rounded; spines in star-shaped bundles of eight or nine, often flat on the top side, articulated, with hooked points, varying in length from 1 inch to 4 inches. Flowers 3 inches long; petals red, with yellowish margins, spreading so as to form a beautiful, large cup, with a cluster of yellow stamens in the centre. Lower

Colorado and California. Under cultivation it thrives in a cool house in winter, with as much sun and warmth as possible in spring and summer. When wild it is often subjected to severe frosts and heavy snowfalls during winter, while in summer the fierce heat of the sun is such as to burn up nearly all vegetation. (Fig. 22.)

E. Grusoni.

A handsome plant, with sturdy, globose stems usually about a foot high. Ribs about twenty, almost hidden by the crowded clusters of stout curved spines, 1 inch to 2 inches long, and of a bright yellow colour. Flowers red and yellow. One of the most

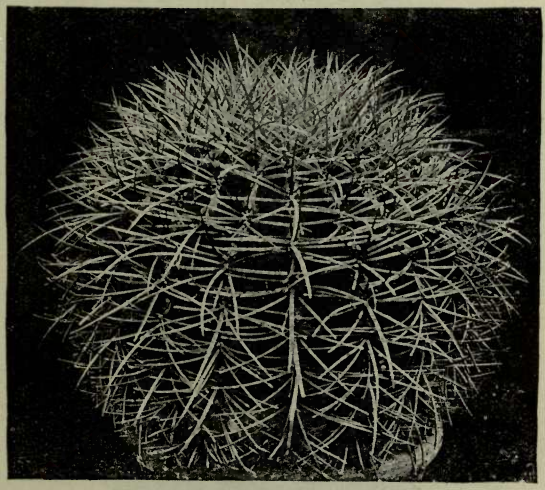

Fig. 23.—Echinocactus Grusoni.

striking of the larger excessively spinous species. Large plants of it have been sold in London under the name of *E. aureus*. Mexico 1895. (Fig. 23.)

E. Haselbergii.

Stem globose, 3 inches high, tubercles small, convex, almost vertically arranged, pale green, each crowned with a tuft of snow-white hairs and a star of about twenty silvery spines, ½ inch or less long. Flowers, red and yellow, 1½ inches wide, composed of about forty petals. Although long known in cultivation, its habitat is unknown. It was figured in the *Botanical Magazine*, t. 7009, from a plant flowered at Kew in 1888.

E. Haynii.

Stem upright, much like that of a Mamillaria in the form and position of its tubercles and hair-like spines. Flowers

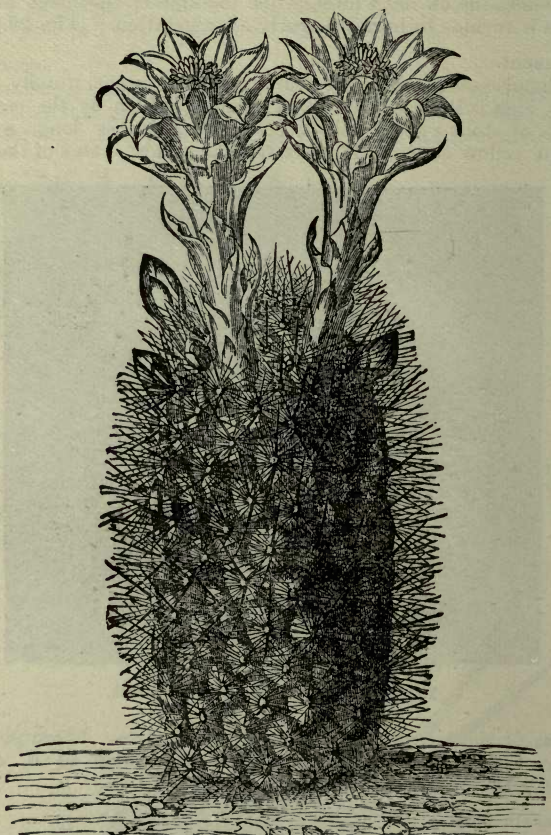

Fig. 24.—Echinocactus Haynii.

longer than in any yet described, the tube being 6 inches in length; petals semi-erect with recurved points, brilliant purple-red Peru, 1850. (Fig. 24.)

E. hexædrophorus.

A species distinguished by its blister-like tubercles, which look as if they would burst if pricked. Stem about 4 inches in height glaucous green, the spines red-brown. Flowers, short-tubed, 2 inches wide; petals in several rows, overlapping each other, white,

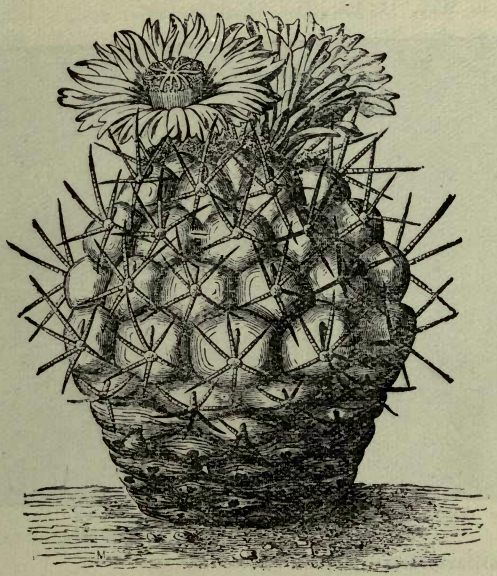

Fig. 25.—Echinocactus hexædrophorus.

tinted with rose; stamens in a disk-like cluster. Mexico, introduced 1830. A slow-growing plant, attaining full size in not less than six years from seed. Like *E. gibbosus*, it does best when grafted on the stem of a Cereus. (Fig 25.)

E. Le Contei.

Stem, when full grown, 5 feet high by 2 feet wide, with broad, deep channels and ridges, wrinkled and covered with a thick network of stout spines (see Fig. 26), which are set in a cushion of whitish wool. The flowers are 2 inches long, bell-shaped, of a bright lemon colour, with a tinge of brown on the outside. It requires warm greenhouse treatment, and plenty of water during the summer.

E. Leeanus.

A small globose-stemmed species having many characters in common with *E. hexadrophorus* and *E. gibbosus*. Flowers 1½ inches long and wide, with a green fleshy tube, whitish scales, white, rose-tipped petals forming a cup, the cluster of pale yellow stamens occupying the whole of the centre. Argentine Provinces, in 1840. Flowers in May. Is happiest when grafted.

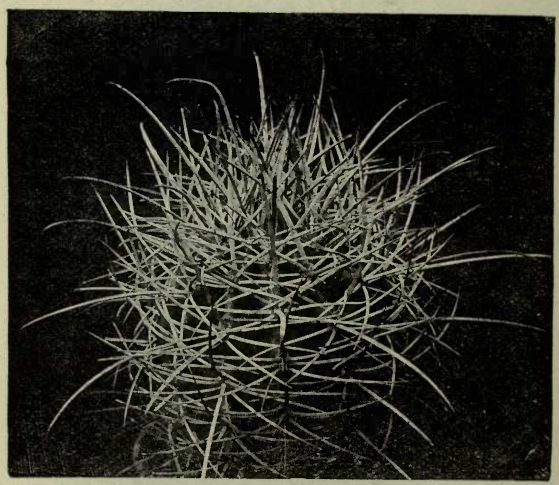

Fig. 26.—Echinocactus Le Contei.

E. mamillarioides.

Stem small, irregular in form, owing to the crowding of the fleshy tubercles. Spines small, in tufts of half a dozen, set in little cushions of yellow wool. It blossoms freely, as many as sixteen flowers having been borne at one time by a plant at Kew. Tube short, clothed with green scales; petals 2 inches long, recurved at the apex, forming a bright yellow cup, with a stripe of red down the centre of each petal; stamens and pistil yellow. The number of flowers developed on the small stem formed by this plant is quite extraordinary. Grows and flowers freely in an ordinary greenhouse, or a sunny window. Chili.

E. mamillosus.

A dumpy little plant, with numerous tubercled ridges, bearing bunches of dark brown hair-like spines. Flowers developed in June, 4 inches in diameter, with a thick tube; petals spreading, bright yellow, arranged to form a cup; stamens purple. Brazil.

E. multiflorus.

A well-named species, its stem, seldom more than 5 inches high, often bearing a large cap-like cluster of beautiful white flowers, except for a slight tinge of brown on the petals. Tube scaly, reflexed petals in several rows forming a cup 2½ inches across; anthers yellow; stigma white. The stem is ridged with rows of fleshy tubercles, which are curiously humped, and each bears a cluster of spreading brown spines, 1 inch long. Mexico, 1845. May be grafted on the stem of a Cereus.

E. myriostigma.

Stem usually divided into five ridges, a transverse section revealing a form exactly like the common starfish (Astrophyton). The white dots shown on the bark, and which look like scales, are composed of very fine interwoven hairs, which, under a microscope, are very pretty objects. The flowers are daisy-like, 1½ inches across, straw-coloured, tipped with black. Requires warm greenhouse treatment. The plant looks more like a piece of chiselled stone than a living vegetable. (Fig. 27.)

E. Orcuttii.

Stems cylindrical, 2 to 3 feet high, 1 foot in diameter, single or in clusters up to eighteen or more. Ribs eighteen to twenty-two, often oblique; spines in clusters of about a dozen, unequal as to length and thickness. Flowers 2 inches long, deep crimson, with a greenish-yellow border, occurring in a ring near the apex of the stem. Fruit globose, green. A near ally of *E. viridescens*, the chief difference being in the colour of the flowers. Lower California. Mr. C. R. Orcutt describes a form of it with "recurving white spines and lemon-yellow flowers."

E. Ottonis.

Stem rarely exceeding 4 inches in height, divided into a dozen ridges with clusters of small, brown spines, set in little tufts of wool, suggesting spiders. Flowers clear, pale yellow, with a band of red hair-like spines surrounding the calyx just below the petals, which are narrow, spreading, and look not unlike yellow Marguerites; stigma red. Thrives only in a warm stove flowering in July. Mexico, 1831. It produces offset plants about its base, and is, therefore, easily propagated.

E. pectiniferus.

A most striking plant, owing to the character of its stem and the large size and beauty of its flowers, which are developed in May. Stem from 4 to 6 inches, and it has about twenty ridges, which are sharply defined, and bear along their angles little cushions of white wool ½ inch apart, with a radiating cluster of brown spines springing from each. The arrangement of the spines in rows is not

unlike the teeth of a small comb. Flowers yellowish, tinged with purple; petals bright rose; stamens yellow; stigma large, green. The form of the flowers is that of a cup, nearly 3 inches across. Mexico, 1845. It requires warm-house treatment.

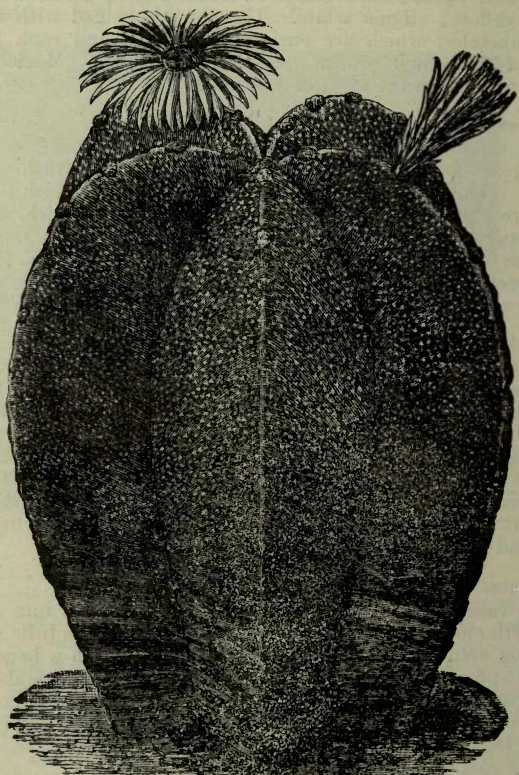

Fig. 27.—Echinocactus myriostigma.

E. polyancistrus.

Stem light green, ovate or cylindrical, 4 to 10 inches high, 3 inches in diameter. Ribs thirteen to seventeen, interrupted, and bearing tufts of about twenty radial white spines, 1 to 2 inches long, and about a dozen central spines, from 1 to

4 inches long, most of which are sharply hooked and coloured dark brown. Flowers 2½ inches long and wide, red or yellow. California.

E. scopa.

Stem sometimes 1½ feet, with from thirty to forty ribs, bearing little disks of white wool at the bases of the clusters of

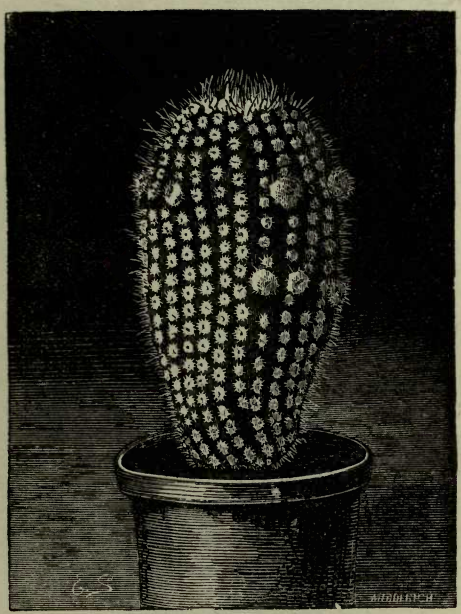

Fig. 28.—Echinocactus scopa.

spines. (Fig. 28.) Flowers 1½ inches long and wide, tube short. bristly; petals sulphur-yellow; stigma bright crimson. Brazil, 1840, It flowers in June, requiring stove treatment. There is a crested variety (*cristata*).

E. Simpsoni.

One of the smallest and prettiest in the genus. It forms tufts of stems about 4 inches high, with rounded tubercles, each with a tuft of about twelve spines ½ inch long. Flowers 1 inch wide and long, cup-shaped; petals pale purple; stamens yellow. Mexico and

Colorado, where it is found at elevations of 8000 to 10,000 feet in great abundance, forming large patches on gravelly morains, where the climate during the summer is dry, whilst in winter a thick covering of snow protects the plants from severe frosts. It

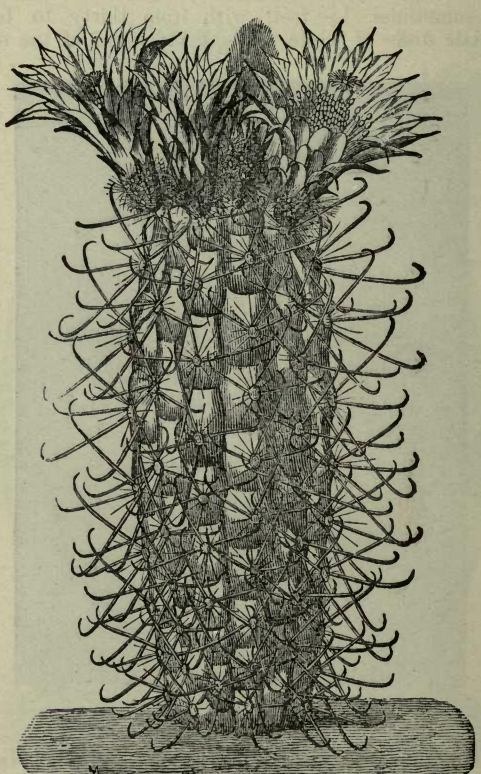

Fig. 29.—Echinocactus uncinatus.

is said to have withstood 32 deg. of frost without being injured in a garden at Northampton. In New York, where the frosts of winter are severer than in England, it is cultivated out of doors. If grown in pots, it should be placed where it can get all the sunlight possible.

E. uncinatus.

Stems oval when young, older plants becoming cylindrical, usual height 6 inches. The ridges are broken into tubercles, each with a tuft of short straight spines, arranged in a circle, and a long hooked one springing from the centre. In old plants the spines are almost white; in young ones they are purplish. Flowers nearly 2 inches long, in a cluster; tube short and spiny; petals purplish-red; stamens yellow. Mexico, 1850. Flowers in March and April. May be grown in a cool, sunny greenhouse, or window.

E. Visnaga.—See page 47.

E. Wislizeni.

In this we have a large-stemmed species, second only in size to *E. Visnaga*. A specimen at Kew was 8 feet high by 18 inches in diameter, with twenty-one regular and sharp-edged ridges, bearing bunches of spines at regular intervals, three of them 2 inches long, and one 3 inches, hooked, and as strong as if made of steel. The flowers are greenish-yellow, about 2 inches long and wide, and expand during summer and autumn. A novel use the stems are put to by the Indians is that of boilers, a purpose which they are said to answer well. The fleshy inside is scooped out, and the tough skin, with its iron-like spine protection, is then filled with vegetables and water and placed on the fire. As there is a plentiful supply of plants, the Indians do not trouble to carry this "boiler" about with them, but make a fresh one at every stage of their journeyings.

Chapter IX.

ECHINOPSIS.

No fewer than three genera of Cactaceæ—namely, Echinopsis, Echinocactus, and Echinocereus—owe their names to their hedgehog-like stems. The genus Echinopsis consists of about thirty species, most of which have been in cultivation. They differ from Echinocactus in the length of the flower-tube, from Cereus in the form and size of the stems, and from both in the position on the stem occupied by the flowers. They are remarkable for the great size, length of tube, and beauty of their flowers, which, borne upon generally small globose stems, appear out of proportion. They grow in sandy or gravelly soil or in the crevices of rocks in Chili, Bolivia, Peru, Brazil and Mexico.

E. campylacantha.

Stem a foot high, globose, with a somewhat pointed top, the sides divided into about fourteen ridges, with tubercled edges, bearing clusters of about ten strong brown spines, which are stellately arranged, a central one projecting outwards, then suddenly curving upwards, and measuring 3 inches in length. Flowers produced in early summer from the side of the stem 6 inches long, the tube shaped like a trumpet, brownish in colour, and clothed with tufts of short black hairs; petals arranged in three rows forming a star 2½ inches across, pale rose-coloured, with a large cluster of yellow stamens. Chili. It thrives in a cool greenhouse, if kept freely watered during summer and rested on a dry, sunny shelf in winter.

E. cristata.

Stem globose, 1 foot high, slightly narrowed towards the top; ridges fifteen, 1 inch deep, sharply angular, the edges bearing tufts of spreading, yellowish spines, over 1 inch long, slightly curved, and tipped with red. Flowers springing from the ridges on the top of the stem; tube 4 inches long, clothed with tufts of black hairs, and surmounted by a whorl of reddish-yellow sepals, above which are two rows of broad-spreading creamy-white petals. The width of the flower is over 6 inches, and the stamens are arranged in a corona-like whorl inside. Bolivia. Introduced in 1850. The broad, long-tubed, pale-coloured blossoms equal in beauty those

of the Night-flowering Cereus. It thrives in a warm, sunny greenhouse, if liberally treated in summer, so as to induce vigorous growth, followed by a complete rest in winter, or it will not flower.

E. c. purpurea.

Differs from the type in having lovely rose-coloured flowers with a longer tube. They develop three or four together in the month of July.

E. Decaisneanus.

Stem globular or egg-shaped, bearing about fourteen ridges, upon which are tufts of short spines, springing from cushions of whitish wool. The tube is densely covered with tufts of hair-like spines, and the petals and sepals are broad, spreading, and white, tinged with yellow. Native country unknown; thrives in

Fig. 30.—Echinopsis Decaisneanus.

a warm, airy greenhouse in summer, and on a dry, sunny shelf in winter. The swollen base of the tube is a good example of an elongated calyx, the swollen portion being the ovary or seed vessel. If, therefore, seeds are desired, the withering flowers should be allowed to remain, and, in time, the upper portion will fall away, leaving the base, which continues to grow till it attains the proportions of a hen's egg. (Fig. 30.)

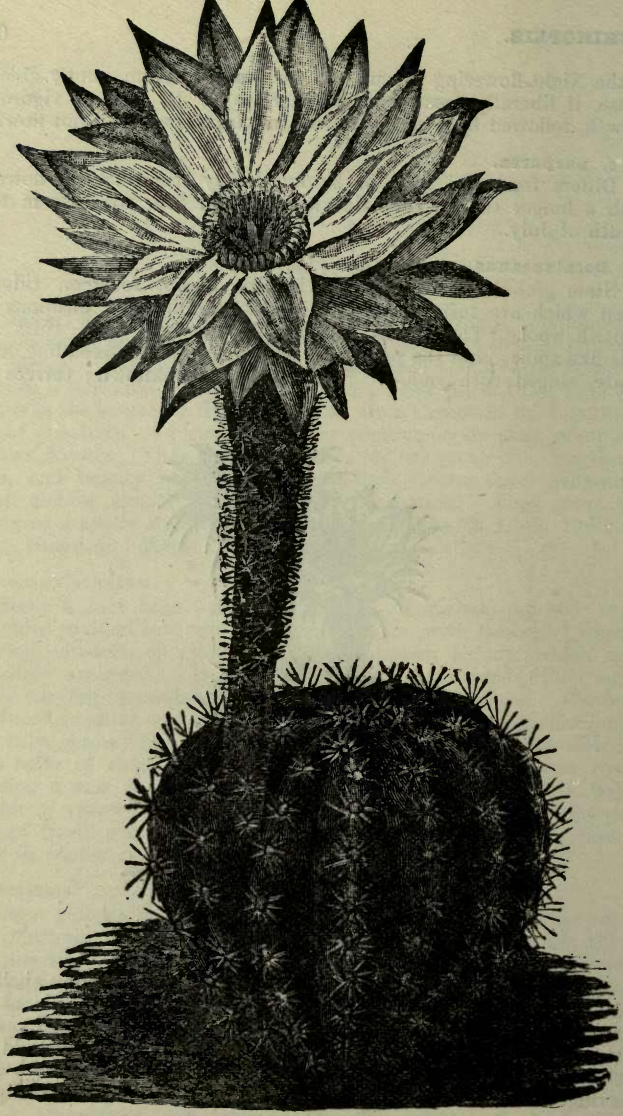

Fig. 31.—Echinopsis Eyriesii flore-pleno.

E. Eyriesii.

Stem the size of a cricket ball, with about a dozen ridges, the edges sharp, and bearing little tufts of whitish wool and red, hair-like spines. Flower large, the tube 6 inches long, funnel-shaped, pale green, with tufts of brown hairs, scattered over the surface; petals numerous, narrow-pointed, spreading, pure white; stamens pale yellow, and the star-like stigma white. Mexico. "Remarkable for the rich, delicate odour the flowers exhale at night, at which time the glorious blossoms expand. When young, they resemble long, sooty-grey horns, covered over with a black, shaggy hairiness, and would never be suspected to conceal a form of the utmost beauty and a clear and delicate complexion. When the hour of perfection has arrived, and the coarse veil of hair begins to be withdrawn by the expansion of the unfolding petals, one is amazed at the unexpected loveliness which stands revealed in the form of this vegetable star, whose rays are of the softest white" (Lindley). This plant requires greenhouse treatment, with plenty of fresh air and as much light as possible.

E. E. flore-pleno.

A form with several rows of petals, which give the flowers a doubled appearance. (Fig. 31.)

E. oxygonus.

Similar to *E. Eyriesii*. Stem globular in shape and divided into about fourteen acute-edged ridges, upon which are tufts of brown spines, varying from ½ to 1½ inches in length. Flower 8 inches long, the tube slightly curved, covered with little scales and hairs, and coloured green and red; petals broad, with pointed tips, forming an incurved cup; their colour a bright rose, paler towards the centre of the flower. Brazil. Introduced about 1850. It should be treated as advised for *E. Eyriesii*; its flowers develop in summer.

E. Pentlandi.

Stem globose, 3 inches wide, divided into about a dozen ridges, which are undulated or broken up into irregular tubercles, crowned with tufts of brown, bristle-like spines, ½ inch long. Flowers large, the tube being 4 inches long, and trumpet-shaped, petals arranged in overlapping whorls and forming a cup 2 inches across, the lowest whorl turning downwards; colour brilliant red, the stamens white, and the stigma yellow. Three or four flowers are often expanded together on the same stem, springing from the side. Mexico; introduced about 1840. There are several distinct forms of this species, having flowers either red, yellow and white, or white. They may all be grown in a sunny greenhouse or window, as they only require protection from frost. If placed out of doors in summer, and under glass in winter, they make better growth

and flower more freely than if kept permanently under glass. (Fig. 32.)

E. P. longispinus.

A long-spined form, differing also in the shape of the stem, which is oblong, rather than globose.

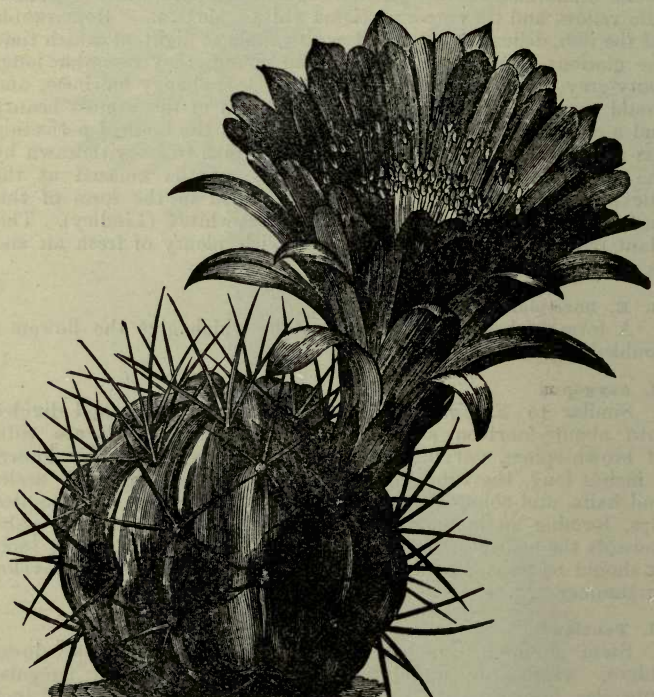

Fig. 32.—Echinopsis Pentlandi.

E. tubiflorus.

Stem orange-shaped, about 4 inches high, divided into about twelve prominent, sharp-angled ridges, along which are tufts of blackish spines, ½ inch long, and set in little cushions of white wool. The flower tube is green, with scale-like bracts fringed with silky black hairs about 6 inches long, and the spread of the petals over 4 inches, pure white, recurved, stamens arranged in a ring, about the small, rayed stigma. Native of Mexico; introduced about fifty years ago.

Chapter X.

MELOCACTUS.

This genus forms a group of well-marked plants, with stems similar to those of the globose Echinocactuses but different in its floral characters. The stems are stiff and dumpy, their spines large and rigid, and their flowers small and unattractive. But lack of beauty of form is atoned for in the large, cushionlike flower-head which crowns the stem, and on old plants is a cylindrical mass of spines and hairs, 1 foot or more in length. This character is most pronounced in *M. communis*, the best-known species in gardens. It was the first Cactus to be introduced into Europe, for in the year 1581 living plants of it were grown in London. Fifty years later Gerard wrote: "Who can but marvel at the care and singular workmanship shown in this Thistle, the *Melocarduus echinatus*, or Hedgehog Thistle? It groweth upon the cliffes and gravelly grounds neere unto the seaside in the islands of the West Indies, called St. Margaret's and St. John's Isle, neere unto Puerto Rico, and other places in these countries, by the relation of divers that have journied into these parts who have brought me the plant itself with his seed, the which would not grow in my garden, by reason of the coldnesse of the clymate."

Thirty species are known, their stems ranging from 1 to 3 feet in height, the ridges straight, and, as a rule, large; whilst all have stiff stout spines. The small flowers are succeeded by bright red, cherry-like berries, containing numerous black, shining seeds.

Cultivation.

These plants need a tropical temperature all the year round, with as much sunlight as possible, and a moist atmosphere for about three months during summer, when growth is most active. Very little soil is required, as the largest stems have comparatively few roots; indeed, imported stems have been known to live and grow for several years without a single root, living on the nourishment stored up in the stem in its native home. M. Louis de Smet, a Ghent nurseryman, kept *M. communis* a long time in robust health and growth by feeding it with a very weak solution of salt, and seeing that the Turk's-Cap Cactus is found in great abundance within the reach of sea spray, in the West Indies, salt is probably good for it. M. de Smet had a specimen of this Cactus bearing

no less than thirteen heads. Large imported plants are difficult to establish ; and even when established, they do not live long, owing to the fact that, after the cap has commenced to form, no further stem-growth is made. The plants grow slowly, an example 3 feet across taking, according to Sir W. Hooker, from 200 to 300 years to reach that size. Mr. F. T. Palmer, in "Culture des Cactées," recommended the following treatment for *M. communis :* Take a *Cereus peruvianus* of about the same diameter as that of the base of the Melocactus, cut off the head of the former, but not so low as to come upon the hard, ligneous axis, and then pare off the hard epidermis and ribs for about 1 inch. Then take off a slice from the base of the Melocactus, also paring off about 1 inch of the epidermis all round ; place the two together and bind on firmly with strong worsted. In warm weather, a union should take place in about two months, but it will be safest to allow the ligature to remain till growth commences. The precaution of paring off the hard skin and ribs is absolutely necessary, as the juicy centre contracts, and the rind, or epidermis, does not. There would, therefore, be a cavity formed sufficient to prevent cohesion, be the graft tied on ever so tightly.

Imported stems should be kept dry for about a fortnight, and, if they show any signs of rottenness, the bad portions cut away ; exposure to the air for a few days will generally cause these pared places to dry and callus.

Propagation.

This is effected by means of seeds, which usually follow the flowers on cultivated specimens. Multiplication is also possible by means of offsets, formed about the base of the stem if the top of a growing plant is cut out. The thirteen-headed plant mentioned above was the result of the removal of the top of a stem which had developed these lateral growths, and thus formed a family of red-capped stems. As the cap is the most remarkable feature, the purchase of large imported stems, in preference to young ones raised from seeds, is recommended ; for, as the cap does not form till the stem attains a large size, there would be small hope of seedlings reaching the flowering stage in a lifetime.

M. communis.

Stem up to 2 feet or even 3 feet in diameter, globose, with from twelve to twenty ridges, and armed with numerous clusters of strong, short spines, the clusters placed closely together. On the summit of the stem is a cylindrical crown, varying in height from 5 to 12 inches, and composed of a whitish, cotton-like substance, through which bristle-like red spines project. The flowers are small, red, fleshy, and tubular, the calyx and corolla forming a regular flower, as in a Hyacinth. The cylindrical cap may be kept

as a curiosity long after the stem has perished. In addition to the name of Turk's-Cap Cactus this plant is also known as "English-

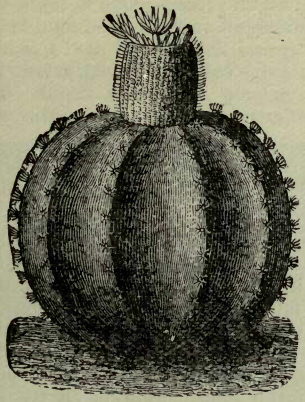

Fig. 33.—Melocactus communis.

man's Head" and "Pope's Head." It grows in abundance in St. Kitt's Island, in very dry places, often on bare porous rocks. (Fig. 33.)

Chapter XI.

PILOCEREUS.

One of the most striking plants in this order is the "Old Man Cactus," *Pilocereus senilis*, the only member of this genus that has become common in English gardens, though more than a dozen species are to be found in botanical collections. Stem tall, erect, thick, simple or branched, fleshy, ridged; the ridges regular, slightly tubercled, and placed closely together. Tubercles generally hairy, with bunches of short spines; hairs long and white, especially about the apex of the stem. Flowers on the extreme top of the matured stems, arranged in a cluster as in the Melon Cactus, small, tubular, with a disagreeable odour, like that of boiled cabbage. Fruit fleshy, round, persistent, usually red when ripe. Natives of tropical America, in rocky gorges or on steep declivities of mountainous regions.

Cultivation.

These plants require tropical conditions and all the sunlight possible. In winter they may be kept quite dry, in a temperature of about 60 deg., rising to 65 or 70 deg. in the day. In March they should be repotted in a good, loamy soil with ample drainage. Should the hairs become soiled or dusty, the stems may be laid on their sides and syringed with a mixture of soft soap and warm water to give them the white appearance to which the plants owe their attractiveness.

P. Houlletianus.

Stem robust, glaucous-green; ridges about eight, broad prominent, obscurely tubercled; spines in bundles of nine radiating straight, less than 1 inch long, and pale yellow, those on the top intermingled with long, white hairs, often matted together like an unkempt head. Flowers funnel-shaped, borne in a cluster on the summit of the plant; ovary short and scaly; petals joined at the base, and coloured a rosy-purple, dashed with yellow; stamens white. Fruit globose, as large as a plum, cherry-red. The pulp is bright crimson, and contains a few brownish seeds.

P. senilis.

This is the Old Man Cactus (Fig. 34). Stem attaining a height of 25 feet, with a diameter of about 1 foot; ridges from twenty-five to thirty on plants 4 feet high; the furrows mere slits, whilst the tufts of thin, straight spines, 1 inch long, which crown each of the many tubercles into which the ridges are divided, give the young stems a brushy appearance. About the upper portion of the stem, and especially upon the extreme top, are numerous white, wiry hairs, 6

Fig. 34.—Pilocereus senilis.

inches or more long, and gathered sometimes into locks. To this character the plant owes its name of Old-Man Cactus; but, by a curious inversion of what obtains in the human kind, old plants are less conspicuous by their white hairs than the younger ones. Some years ago there were three fine stems of this Cactus among the cultivated plants at Kew. the highest of which measured 18½ feet. There

was also a magnificent specimen in the Oxford Botanic Gardens, with a stem 16 feet high : and it is stated that this plant had been in cultivation in England a hundred years at least. A plant twenty-five years old is quite small, and, from its slowness of growth, there is reason to believe that a stem 20 feet high would be several hundred years old. The flowers of *P. senilis* are not known in English collections, the plant being grown only for its shaggy hairiness.

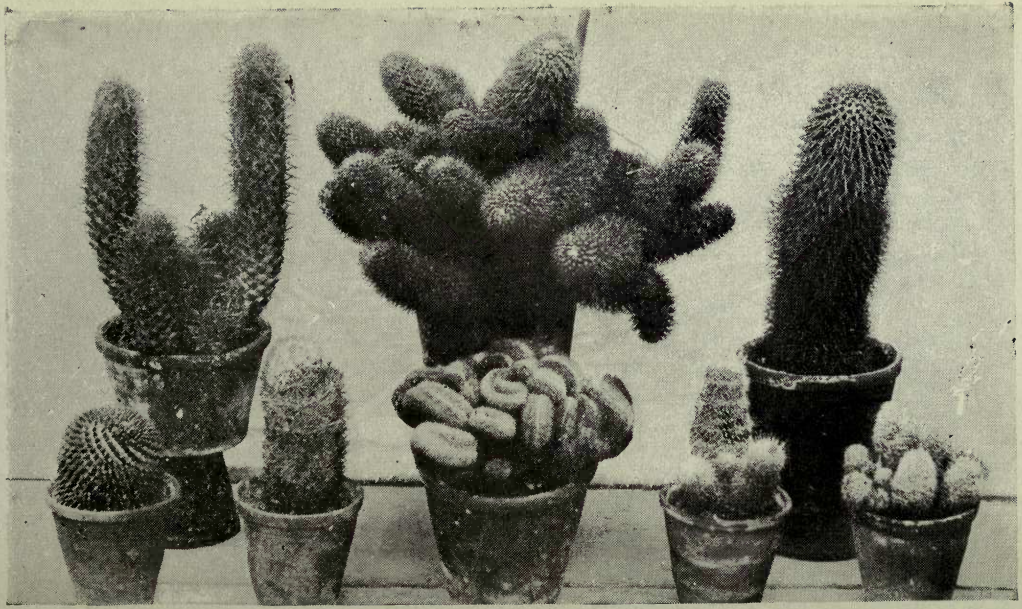

Photo by] **Group of Mamillaria.** *[C. P. Raffill.*

Chapter XII.

MAMILLARIA.

Over 300 Mamillarias are known. They are characterised by short, symmetrically-formed stems, sometimes aggregated together and forming a dense tuft, or with only a single stem. The closely-set, spirally-arranged tubercles or mamillæ, vary considerably in the different kinds. Some have stems only 1 inch high by $\frac{2}{3}$ inch in diameter, with tubercles hidden by the star-shaped cushions of reddish or white spines. In others, the spines are erect and hair-like, giving the plant the appearance of tiny sea-urchins; another group has the principal spines hooked at the tip, and as sharp as fish-hooks. The purpose of these hooked spines seems doubtful; certainly, they cannot be of use as a protection, as they are so strong that the plant would be torn up by the roots before the hooks gave way.

Some of the species, such as *M. angularis*, form large cushion-like masses not unlike those formed by the sheep plant (*Ravulia*) of New Zealand. *M. clava* is described as forming clumps composed of about fifty plants 2 feet high, each plant bearing about a dozen large yellow flowers open at one time, and making a most gorgeous display on the plains of Mexico. The spines in *M. macromeris* are straight, and measure 2 inches in length; in *M. multiceps* they are in two series, the one fine, white, and short, the other yellow and stout.

The following description of *M. tenuis*, by Dr. Lindley, gives a good idea of the stems of some of these plants: "Gentle reader, hast thou never seen in a display of fireworks a crowd of wheels all in motion at once, crossing and intersecting each other in every direction; and canst thou fancy those wheels arrested in their motion by some magic power—their rays retained, but their fires extinguished and their brightness gone? Then mayst thou conceive the curious beauty of this little herb—a plant so unlike all others that we should fain believe it the reanimated spirit of a race that flourished in former ages, with those hideous monsters whose bones alone remain to tell the history of their existence." Without foliage, their stems globose or cylindrical, or packed close together in little cushion-like tufts, enveloped in silky spines, like tiny red stars, they are very different from ordinary plants. The flowers of many of the species are quite attractive. Those of *M. macromeris* are 3 inches long and wide, their colour a deep rose;

M. Scheerii has equally large flowers, and coloured bright yellow, as also are the flowers of *M. pectinata*. This last is remarkable on account of the clock-like regularity with which its flowers expand. While fresh, they open every sunny day between eleven and twelve o'clock, and close again about one, however strong the sunlight shining upon them may be. Some of the kinds are prettily studded over with bright red, coral-like little fruits.

The headquarters of the genus is Mexico and the countries immediately to the north, a few being found in the West Indies, Bolivia, Brazil, and Chili. Many of them grow on mountains where the temperature is moderate, but where the sunlight is always intense. Others are found on limestone or gravelly hills, among short herbage, or on grassy prairies. A small silvery-spined kind has recently been found near the snow line in Chili. *M. vivipara* is quite hardy in New York. By planting them out in summer, and protecting them by means of a frame from heavy rain and sudden changes of weather in winter, a good many species can be successfully grown.

Cultivation.

With only a few exceptions, all the cultivated Mamillarias may be grown in a warm, sunny greenhouse, or they may be placed in a frame with a south aspect, during our summer, removing them into artificially-heated quarters for the winter. They do not require much soil, thriving best when in comparatively small pots. A fibry loam, mixed with broken bricks or cinders may be used for them. Harm is often done to the more delicate Cacti by repotting them annually. The pots should be well drained with crocks, and these covered with a layer of fibre sifted from loam. In summer, the soil should be kept moist, but never saturated; and after a bright warm day, the stems may be moistened over by syringing them with tepid water. A point of much importance with these, and indeed all tropical and extra-tropical plants, is, that the water used for watering or syringing them should be rainwater if possible, and never more than a degree or so colder than the plants themselves. A plant which had been standing in the full glare of a midsummer sun all day is endangered by watering it with cold water. Where proper arrangements for water are not made in a greenhouse or a stove, it is a good plan to place the water wanted for the day's use in the sun along with the plants. Mamillarias should be kept quite dry at the roots in winter.

A collection of species may be successfully managed in a glass case in a room window, provided the sun shines through it for a few hours in the day.

Propagation.

This is usually effected by means of seeds. The tufted kinds are easily multiplied by separating the stems, or even by cutting off the tops and planting them in small pots of sandy soil.

M. angularis.

A robust kind, with stems from 4 to 8 inches high, branching somewhat freely; tubercles prism-shaped, rather thick at the base, and slightly angular, ¼ inch long, their tops tufted with short white spines; at the base of the tubercles are little tufts of white wool. Flowers rarely produced by cultivated plants; they are small, tubular, rosy-purple, the stamens yellow. Introduced from Mexico in 1835. Requires a warm greenhouse during winter, and exposure to bright sunshine at all times.

M. applanata.

Stem broader than high, tubercles ¾ inch long, cone-shaped with stellate tufts of straight, hair-like spines, white when young, yellowish when aged. Flowers springing from the outside of the stem-top, white, tinged with red. Native of Mexico.

M. atrata.

Stem oval in shape, broad at the base, 4 inches high, unbranched; tubercles swollen, ½ inch long, deep green, cone-shaped, becoming flattened through pressure of growth. Spines set in a tuft of white hairs, falling off from the lowest mammæ, as happens in many of the thick-stemmed kinds. Flowers numerous, and developed all round the outside of the stem, nestling closely between the tubercles, and when expanded looking like starry buttons of a rosy-pink colour. Native of Chili. It will thrive in a cold frame, and requires protection from excessive wet only.

M. barbata.

Stem globose, simple, about 2 inches high, with short tubercles, each crowned with a tuft of about fifty radial spines, less than ½ inch long, white or yellow, and one or two central, brown, hooked spines. Flowers small, rose-red. Mexico. Said to be hardy in England, but it succumbed to the cold and wet of winter when tried at Kew.

M. bicolor.

One of the commonest and most distinct, owing to its short, silvery hair-like spines, thickly crowded on the ends of the small tubercles, completely hiding the stem. The latter is from 6 inches to 1 foot high, 3 inches in diameter, cylindrical, often branching. If kept from dust, by covering the plant with a bell-glass, there is much charm in the stem. Flowers are less than 1 inch in length, stellate, their colour deep purple. Native of Mexico at 4000 to 5000 feet. It thrives best when grown in a warm house, or in a warm room-window if exposed to bright sunlight and kept dry in winter. *M. nivea* and *M. nobilis* are varieties.

M. Bocasana.

A pretty little plant, with globose stems, less than 2 inches high, the tubercles set in long, axillary white wool, the radial spines white

and hair-like, the central (of which there are four, one hooked) red. A healthy plant looks like a ball of white hair, beset with slender red hooks. Requires tropical treatment. Mexico.

M. chlorantha.

Stems erect, cylinder-shaped, 6 inches high, clothed with numerous tubercles, which are tipped with clusters of long, silvery, interlacing, hair-like spines, and a few stouter blackish ones. The flowers are greenish-yellow. Native of Mexico and Texas. It requires cool-house treatment, and should be kept free from dust.

Fig. 35.—Mamillaria compacta.

M. cirrhifera.

Stem 5 inches high, tubercles angular, spines yellow tipped. Flowers, small, bright rose-coloured. Will thrive anywhere where the sun can shine upon it, if sheltered from severe cold and wet. In a cottage window it may be kept for many years. Introduced from Mexico in 1835.

M. clava.

In size of stem, and its large, brightly-coloured flowers, this species is more like one of the Echinocactuses. It is from 1 foot to 2 feet high, 4 inches wide at the base, narrowing slightly upwards; the tubercles are 1 inch long, nearly as wide at the base, and tipped with from eight to eleven stout, straight pale-brown spines, with a little wool at the base. Flowers on the top of the

stem, two or three together; sepals green and red, petals straw-coloured. The shallow cup formed by the petals measures 4 inches across, stamens orange-coloured. Native of Mexico. Introduced in 1848. A warm greenhouse affords the most suitable conditions for it. One of the very best of the Mamillarias. Easily propagated from seeds.

M. compacta.

Resembles *M. pectinata* in its globose single stem, rigid comb-like radial spines, the absence of a central spine, and the large terminal flower produced on the apex of the stem, which is from 2 to 4 inches in diameter; the spines are whitish, and the flowers yellow, tinged outside with brown. It requires the same treatment as *M. pectinata*, and is a native of Mexico. (Fig. 35.)

M. dasyacantha.

Stem 3 inches high, almost globose and covered with spiral whorls of tiny tubercles, in the grooves of which is a little whitish wool, which falls away as the tubercles ripen. The spines are arranged in little stars upon the tubercles, central spine erect. Flowers small, springing from the centre of the stem. This is one of the Thimble Cactuses, and a pretty plant, especially when studded with its daisy-like flowers. Native of Mexico, where it grows on high mountains among short grass and other herbage.

M. discolor.

Stem globose, about 4 inches in diameter; tubercles smooth, egg-shaped, embedded in white wool, and crowned with stellate tufts of short, reddish spines. Flowers numerous, from almost all parts of the stem, 1 inch wide, with reflexed, rose-purple petals, surrounding a large, disk-like cluster of yellow stamens. Native of Mexico, where it grows on sunny rocks. It may be grown on a dry shelf in a greenhouse, keeping it moist in summer, but dry in winter.

M. dolichocentra.

A variable species. What is known as the type (Fig. 36) has a stem 8 inches high and 3 inches wide, covered with smooth cone-shaped mammæ, with woolly bases and stellate tufts of spines on their tips. Flowers less than 1 inch wide, often very numerous, sometimes a ring of them surrounding the stem, like a daisy chain, their colour being pale purple. Below the flowers there is often a whorl of club-shaped fruits, $\frac{3}{4}$ inch long, and rose-coloured. Native of Mexico. It thrives in a warm sunny greenhouse.

M. echinata.

A charming little plant, the small stems, less than 1 inch wide, clustered together in a cushion-like tuft, a well-grown specimen being composed of dozens of stems, packed close together. The

tubercles are hidden by the star-like spine-clusters which cap them. Flowers small, rose-coloured, lasting only about a day. They are succeeded by numerous currant-like red berries, so that the plants look as if thickly studded all over with coral beads. Central stem

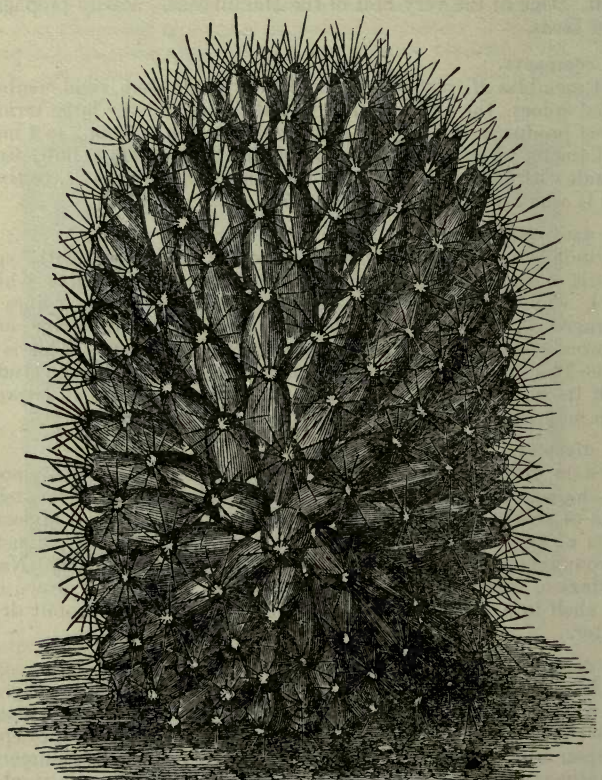

Fig. 36.—Mamillaria dolichocentra.

sometimes 6 inches high, those surrounding it being shorter and shorter, till the outside ones rise only just above the soil. Native of Mexico, requiring a warm house. A few pieces of broken brick should be placed upon the surface of the soil about the base of the plant.

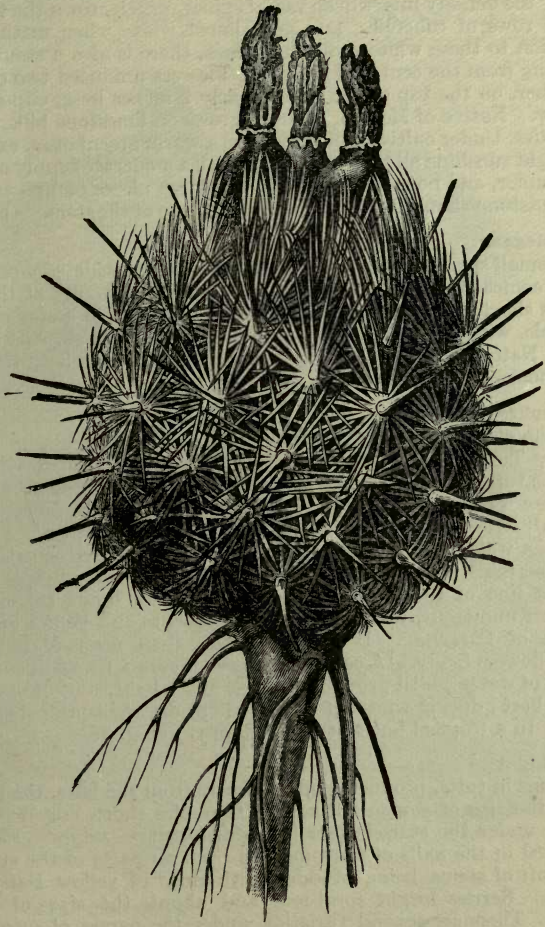

Fig. 37.—Mamillaria echinus.

M. echinus.

Stem about the size and shape of a hen's-egg, completely hidden under the densely interwoven radial spines, which crown the thirteen spiral rows of tubercles, and are almost white when mature. In addition to these white radiating spines, there is also a stout spike, growing from the centre of the ray. Flowers produced two or three together, on the top of the stem, nearly 2 inches long, cup-shaped, yellow. Native of Mexico, where it grows on limestone hills, in arid localities. Under cultivation it requires a warm greenhouse, exposure to bright sunshine all the year round, with a moderate supply of water in summer, and none in winter. A few large pieces of broken brick or sandstone should be placed about the base of the stem. (Fig. 37.)

M. elegans.

A small species. The stem 2 inches high and wide, globose, with small conical tubercles, which, when young, are woolly at the tips. Spines short and slender, about twenty, arranged in a star on each tubercle, with four central ones a little longer, whitish, with brown tips. Native country Mexico, on high exposed hills. Requires greenhouse treatment.

M. elephantidens.

Stem globose, depressed, 6 to 8 inches in diameter, bright shining green. Tubercles smooth, round, 1½ inches long, furrowed, with a dense tuft of white wool at the base, whilst springing from each furrow are eight radiating recurved spines, and three short central ones, all strong, stiff, and ivory-white, tipped with brown. Flowers 3 inches wide, composed of a ring of violet-coloured sepals, with white margins, and a second ring of bright rose petals, purple at the base, a line of the same colour extending all down the middle. Stamens numerous, with long purple filaments and yellow anthers. Native of Paraguay. It grows quicker than most Mamillarias, and it flowers freely. A cool greenhouse or sunny frame in summer, plenty of water whilst growth is active, and a light, well-drained soil suit it best; during winter it must be kept dry, and protected from frost. In a tropical house it is less happy. (Fig. 38.)

M. elongata.

Stems in tufts, producing offsets freely from the base, the tallest about the size of a man's thumb. Tubercles short, crowded, and hidden under the star-clusters of reddish-yellow spines. Flowers produced in the axils of the tubercles from all parts of the stem, a large tuft of stems being studded with rings of yellow Daisy-like flowers. Berries bright coral-red, and about the size of date-stones. There are several varieties, under the names of *intertexta*, *rufescens*, *rutila*, *subcrocea*, and *supertexta*. All may be grown in a cold frame, or in a window where the sun can shine upon them. Natives of high mountains in Mexico.

M. floribunda.

Stem conical, about 5 inches high by 4 inches wide at the base with round nut-like tubercles, crowned with star-tufts of stiff, brown spines ¾ inch long, set in pads of dirty-white wool. The

Fig. 38.—Mamillaria elephantidens

flowers are numerous, covering the whole top, from which they stand erect, forming a bouquet of rose-coloured petals. Native of Chili. Flowers in summer. It thrives in a greenhouse or a sunny window.

M. gracilis.

Stem proliferous, 2 inches high, producing numerous branches which fall off and take root. Tubercles small, green, crowded; spines in a stellate tuft, short, curved, pale yellow or white. Flowers as in *M. elongata*, to which this species is closely allied. Grows well in window cases, or on a shelf in a cool greenhouse. Mexico. The variety *pulchella* has bright yellow spines.

M. Grahami.

Stem globose, 3 inches high, branching sometimes when old; tubercles $\frac{1}{4}$ inch long, egg-shaped, corky when old, and persistent. Spines about $\frac{1}{2}$ inch long, in tufts of about twenty, all radiating except one in the centre, which is hooked. Flowers bright red, 1 inch long, produced in a circle round the stem. Fruit a small, oval berry, $\frac{1}{2}$ inch long. Colorado Mountains.

M. Haageana.

Habit as shown in the figure, which is reduced to about one-fourth the natural size. As the stem gets older, it becomes more elongated. Tubercles four-sided, pointed at the top, The spines

Fig. 39.—Mamillaria Haageana.

arranged in a star, with two central ones, which are longer, stiffer, and much darker in colour. Flowers small, almost hidden beneath the spines, bright carmine-rose; produced on the upper part of the stem in June. Mexico, 1835. (Fig. 39.)

M. lasiacantha.

A pretty little plant with depressed, spreading stems 1 inch high, forming a dense tuft, the crowded, small tubercles hidden by the numerous, spreading, radial, white, wool-like, feathered spines, by which it is easily distinguished from *M. Bocasana*,

and also by having no central or hooked spines. Flowers small, white, with pink stripes. One of the most attractive of the small Mamillarias. Texas, Arizona, &c. Var. *plumosa* has longer spines, more distinctly feathered. Var. *denudata* has unfeathered spines.

M. longimamma.

Stem seldom more than 4 inches high, branching at the base when old. The tubercles at least 1 inch long, terete, slightly curved, and narrowed to a pointed apex, the texture being very soft

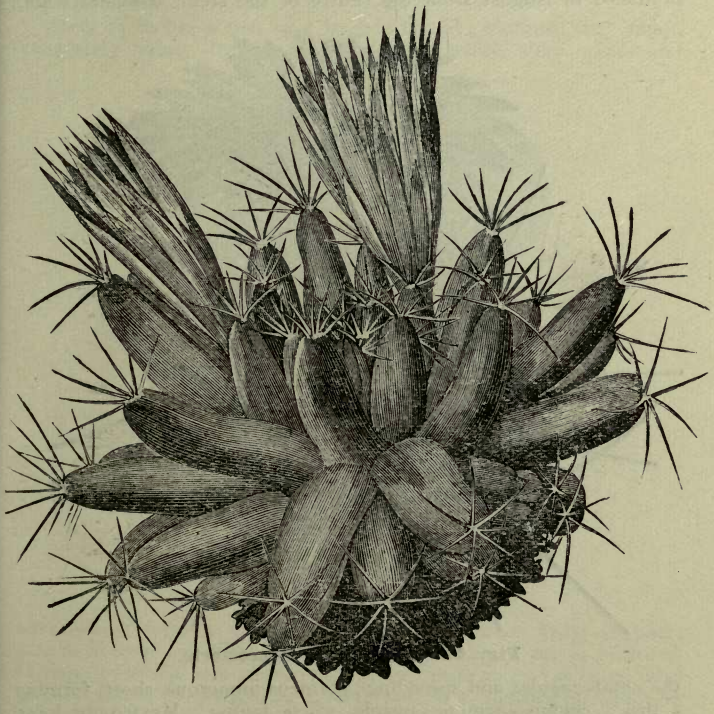

Fig. 40.—Mamillaria longimamma.

and watery. Each tubercle bears a radiating tuft of about twelve spines, one central and projecting outwards; they are white when young. A tuft of short, white wool is developed at the base of the spines on the young mammæ. Flowers large and handsome, citron-

yellow; tube short, petals 1½ inches long, narrow, pointed, and all directed upwards. Native country, Mexico. Requires greenhouse treatment, or may be placed in a sunny frame out of doors during summer. (Fig. 40.)

M. macromeris.

Stem 4 inches high, woody and wrinkled when old. Tubercles as in *M. longimamma*, but with needle-like spines often 2 inches in length, white when young, almost black when old. Flowers produced in August from the centre of the stem, 3 inches wide;

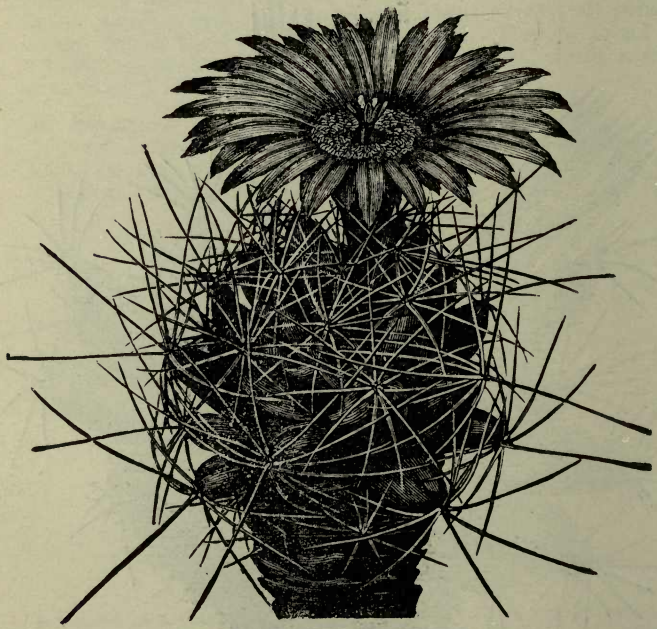

Fig. 41.—Mamillaria macromeris.

the petals regular and spreading; stamens numerous, short, forming a disk; colour carmine, purple when fading. Mexico, in loose sand. Requires the same treatment as *M. longimamma*. (Fig. 41.)

M. macrothele.

Belongs to the same group as *M. cirrhifera*, but the large mammæ are four-angled, narrowed to a point, upon which is a tuft of wool and a cluster of about eight reddish spines, ½ inch long,

spreading, the central one almost black, 1 inch long, pointing downwards. In the axils of the mammæ are tufts of white wool. Flowers produced in summer from the top of the stem, erect, spreading, about 1½ inches across, pale yellow; stamens red at the base, in a dense cluster; rays of the stigma spreading. Mexico, on prairie lands, at high elevations, therefore almost hardy in the warmer parts of this country, suffering from damp rather than fros in winter. It flowers annually if grown in a cool, well-aired greenhouse or frame, with the sun shining on it all day.

M. micromeris.

Stem 1½ inches across by 1 inch in height; mammæ very small, completely hidden by the numerous fine, white, silky spines and

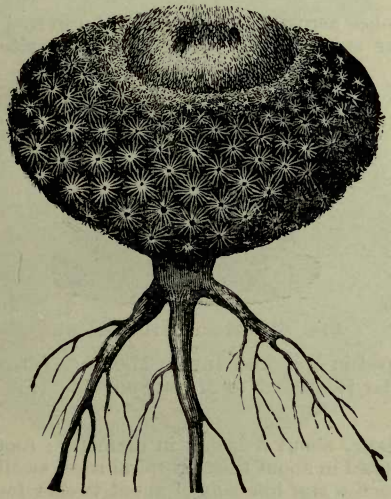

Fig. 42.—Mamillaria micromeris.

wool which form a spider-web-like net. Flowers white or pink, ½ inch across. Mexico, on mountain where limestone is plentiful. It requires much care under cultivation, water in excess being fatal to it. Should be planted in a small pot, in a mixture of loam and lime rubbish, and grown in a warm greenhouse. (Fig. 42.)

M. multiceps.

Stem short, with numerous branches, forming a dense tuft. Mammæ small, arranged closely together, each with a tuft of whitish wool, and a radiating cluster of hair-like spines, the inner ones

stiffer. Flowers small, almost hidden by the spines, pale yellow with a line of red down the middle of each petal. Mexico. Should be grown on a shelf in a cool greenhouse—a stove temperature being fatal to it.

M Neumanniana.

Stem about 6 inches high, cylindrical, the tubercles arranged spirally, their bases compressed, four or five-angled, with a tuft of white wool in their axils. Spines about seven in a tuft, ½ inch long, and of a tawny yellow colour. Flowers produced near the top of the stem about ½ inch long, rose-red. Mexico. Requires the same treatment as *M. cirrhifera.*

M. Ottonis.

Stem 3 inches across, crowded with compressed tubercles, and short, hair-like spines. Flowers, large for the size of the plant,

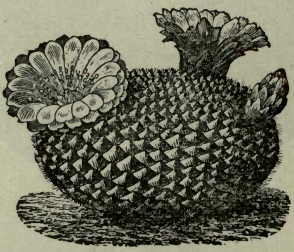

Fig. 43.—Mamillaria Ottonis.

white, developed in May and June. Mexico. Introduced in 1834. Requires similar treatment to *M. micromeris.* (Fig, 43.)

M. pectinata.

Stems globose, about 3 inches in diameter; rootstock woody; tubercles arranged in about thirteen spiral rows, swollen at the base, and bearing each a star-like tuft of about twenty-four stiff, brown, radial spines, comb-like in their regular arrangement. When not in flower it bears a close resemblance to *Cereus pectinatus.* Flowers terminal, solitary, 3 inches wide when fully expanded; sepals reddish-green; petals rich sulphur yellow; stamens reddish. They open at noon, and close after about two hours. June to August. Mexico, on limestone hills. Requires warm greenhouse treatment, with exposure to full sunshine, and in late autumn plenty of air to ripen it. (Fig. 44.)

M. phellosperma.

Resembles *M. Grahami* in all points except the seed, which is half enveloped in a corky covering, suggesting acorns. Stem simple,

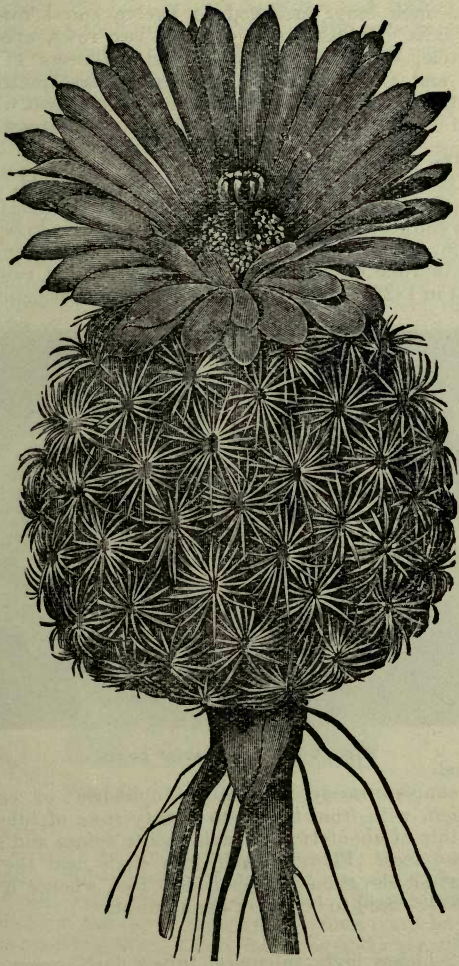

Fig. 44.—Mamillaria pectinata.

sometimes proliferous at the base, globose when young, afterwards almost cylinder or pear-shaped, 5 inches high, 2 inches in diameter; tubercles ½ inch long, arranged in twelve spiral rows, slightly woolly in axils. Spines 1 inch long, in two rows, about fifty on each tubercle, the central ones hooked. Flowers 1 inch wide. California and Colorado, requiring greenhouse treatment. One of the most ornamental, the radial spines being almost white, whilst the central ones are black, and look like tiny fish-hooks.

M. pulchra.

Stem globose when young, cylindrical when old, and about 6 inches high; tubercles large, egg-shaped, arranged in from eleven to thirteen spiral rows; spines in compact tufts, set in whitish wool, irregular in length, almost covering the whole stem. Flowers developed in June near the top of the stem, bright rose. Mexico. Introduced in 1826. Has been also called *M. pulcherrima*.

Fig. 45.—Mamillaria pusilla.

M. Purpusi.

Stem simple, rarely proliferous, cylindric or cone-shaped, 4 inches high, with from twelve to twenty rows of tubercles, each bearing a tuft of about twenty radial white spines and six central, red, straight ones. Flowers small, in a circle near the apex, red. Colorado, at an elevation of about 9000 feet, whence it was introduced in 1894. Said to be one of the hardiest.

M. pusilla.

Stems 2 inches high, tubercles, tufted dark green, with pads of whitish wool in the axils; spines bristle-like, twisted, 1 inch long,

whitish, with black tips. Flowers in May, yellowish-white, with streaks of red. Mexico. Should be grown in a frame in summer, and wintered on a shelf in a greenhouse. The variety *texana* differs in being more densely clothed with spines. It will form tufts 1 foot in diameter. (Fig. 45.)

M. pycnacantha.

Stem 6 inches high, tubercles rather large, swollen, with tufts of short white wool in their axils, and stellate clusters of spines springing from disks of white wool on the top; spines ½ inch long, flattened, pale brown. Flowers large, produced in July in clusters on the top of the stem, about half-a-dozen opening together; colour a deep sulphur yellow, anthers orange. Mexico. Introduced 1840. This is a beautiful little plant, which should be grown in a warm greenhouse all the year round. Old stems develop offsets from the base, by which the species may be multiplied.

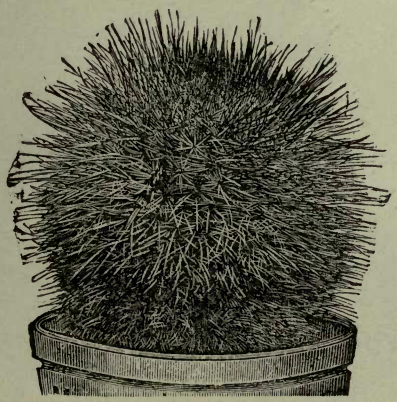

Fig. 46.—Mamillaria sanguinea.

M. sanguinea.

Stem 6 inches high, and 4 inches through; tubercles crowded, short, bearing stellate tufts of shortish spines, and projecting longer ones, all being bristly and yellow. Flowers produced in June in a circle on the top of the stem, a strong plant having about forty flowers open together. Each ½ inch long and wide, and coloured bright crimson, with yellow anthers. Mexico. The plant figured is a young one, showing the spines much longer than is usual on mature specimens. (Fig. 46.)

M. Scheerii.

Stem globose, 5 inches in diameter; tubercles large, swollen, somewhat flattened, pale green, watery, woolly in the axils, the tops crowned with about a dozen brown spines, one central, the others radial. Flowers terminal, erect, 2 inches across, with several whorls of spreading, recurved petals, the lower ones crimson, the upper pale yellow; anthers forming a compact sheaf in the centre. Mexico, where it was discovered in 1845, growing in red, sandy loam. Requires warm-house treatment.

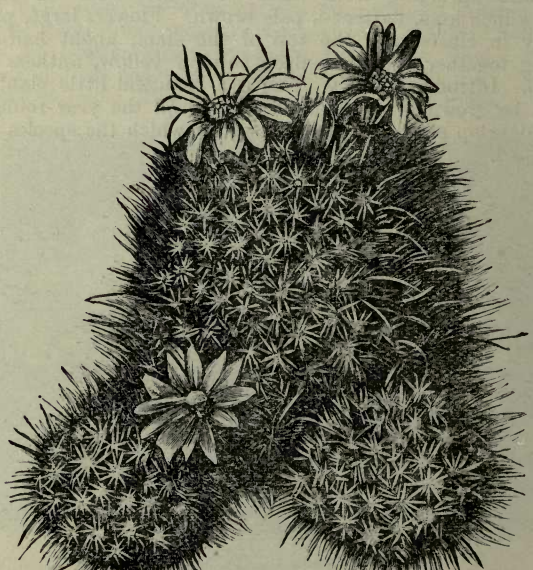

Fig. 47.—Mamillaria Schelhasii.

M. Schelhasii.

Stems branched and tufted, often forming a cushion; tubercles closely arranged, green, with white, hair-like spines, ½ inch long, the central ones purplish and sometimes hooked. Flowers white, with a line of rose down the middle of each petal, ¾ inch across. Mexico. May be grown out of doors in a sunny position in summer, and wintered on a shelf in a greenhouse. (Fig. 47.)

M. Schiedeana.

Stem globose proliferous, 5 inches high, thickly clothed with narrow, pointed tubercles, set in white wool, the apices crowned with tiny stars of white silky spines, like the pappus of a Composite, giving the plant a pretty silky appearance which cannot well be described. Flowers small and unattractive; succeeded by red fruits, which add to its beauty. Mexico. Introduced 1838. It is easily increased, either from seeds or by means of offsets developed at the base.

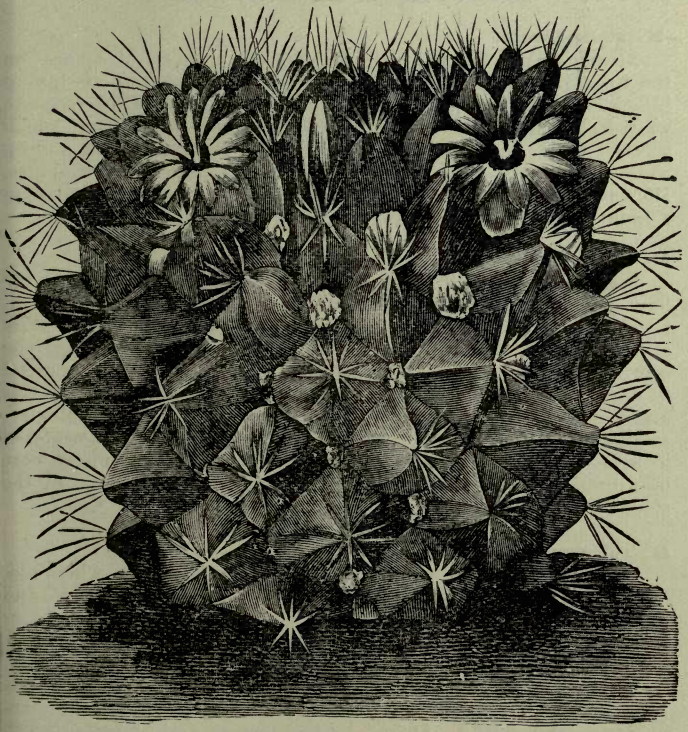

Fig. 48.—Mamillaria sub-polyhedra.

M. senilis.

Stem about 3 inches high, globose, unbranched, except when very old, when it becomes proliferous at the base; tubercles crowded, small, arranged spirally, and crowned with clusters of long, radiating

white, hair-like spines, which become interwoven, as in the Old Man Cactus. Central spine black, hooked at the tip. Flowers on the top of the stem, near the centre ; the petals forming a deep cup, with a cluster of tall stamens standing erect in the middle ; colour bright scarlet. They appear in summer, and remain open about eight hours. Native country unknown. This plant grows best when it is grafted on a short Cereus, or a robust Mamillaria, such as *M. cirrhifera*. It is a pretty plant at all times, even when dead, as it preserves the appearance of a living specimen after nothing remains but the shell formed by the skin and silvery spines.

M. stella-aurata.

Stems small, bearing yellow stellate clusters of spines on the tips of the small, pointed tubercles. It belongs to the group called Thimble Cactuses, and is one of the prettiest. Flowers small, whitish, and much less ornamental than the berry-like fruits which succeed them, and which are egg-shaped, ½ inch long, and a deep rose-colour. *M. tenuis* is a variety, with almost white spines. Mexico. Introduced 1835. Can be cultivated under a bell-glass in a room window, the only danger being from damp during winter.

M. sub-polyhedra.

Stem simple until it becomes old, when it develops offsets at the base, 8 inches high, 5 inches in diameter. Tubercles prism-shaped, bearing pads of white wool at the base, and crowned with tufts of from four to seven spines, usually all radial, sometimes one central. The flowers, which usually appear in May, are arranged in a ring on the top of the stem ; sepals greenish-yellow, petals bright red. Fruit 1 inch long, pear-shaped, scarlet. South Mexico, at high elevations. May be grown outside in summer, and wintered in a heated greenhouse or frame. A slow grower, requiring care in winter, when the roots are apt to perish and the base of the stem to rot. (Fig. 48.)

M. sulcolanata.

Stem simple when young, proliferous at the sides when old, the young plants developing from the apices of the tubercles, and not in the axils, as is usual. Tubercles nut-shaped, the bases surrounded by white wool, the points bearing eight to ten rigid, brown spines set in a little pad of wool. Flowers 2 inches across, bright yellow, poppy-scented ; the spread of the petals suggests Paris Daisies ; they are freely developed on the apex of the stem in June and on till August. Fruit egg-shaped, green. South Mexico ; introduced 1836. Should be grown in a frame exposed to full sunshine all summer, and removed to a shelf in a warm greenhouse in winter. Grafted on to a Cereus or an Opuntia it is healthier than when on its own roots. (Fig. 49.)

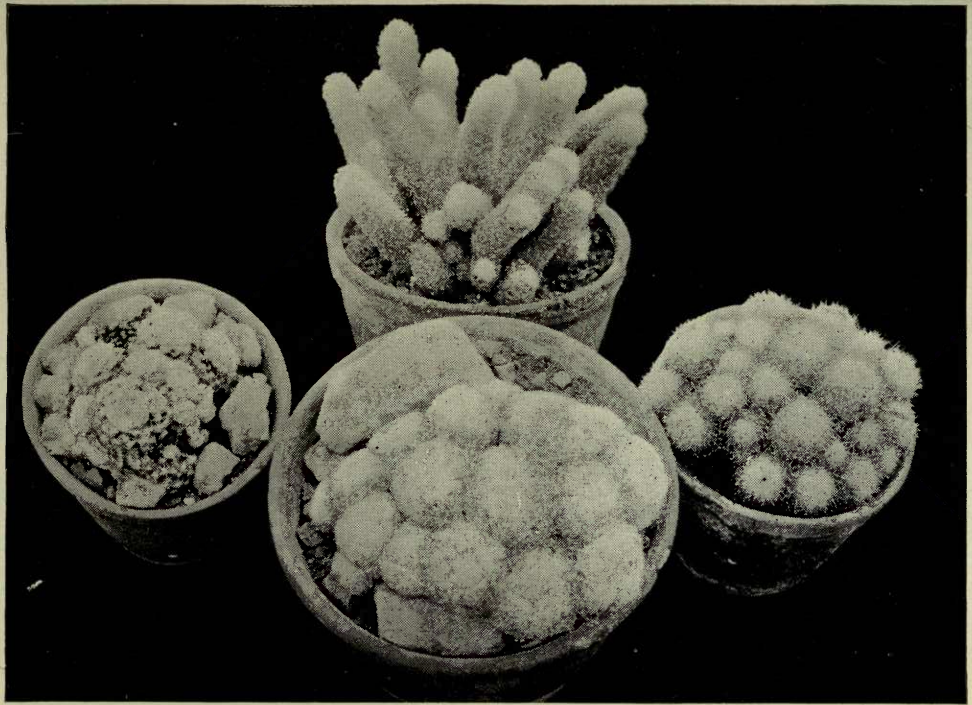

Photo by] [*C. P. Raffill.*

Group of small Mamillaria.

M. tetracantha.

Stem the size of an ostrich's egg, thickly studded with small conical tubercles, woolly at the base, crowned with four spreading spines, ¾ inch long, rather stout, straight, brown when young, almost white with age. Flowers numerous, small, bright rose, with orange-yellow anthers, developed in July. Mexico. Requires the same treatment as *M. cirrhifera*, to which it is related.

Fig. 49.—Mamillaria sulcolanata.

M. tuberculosa.

Stem 6 inches high by 2 inches in diameter, conical, usually surrounded at the base by globose offsets; tubercles ½ inch long, closely set in spiral rows, crowned with slender, hair-like, white spines, ½ inch long; central spines three or four. The spines fall from the old tubercles, which gradually harden to a cork-like substance. Flowers produced in the apex of the stem, 1 inch long and wide, daisy-like, pale purple, succeeded by red, oval berries. About five flowers are developed on each stem annually—May and June. Mexico. It thrives in an ordinary green house, on a shelf, in full sunshine.

M. turbinata.

Stem globose, depressed at top, about 3 inches in diameter, pale glaucous-green; tubercles quadrangular, flattened at the apex, and bearing, when young, from three to five erect, slender, hair-like spines, which fall off soon after the tubercles ripen, exposing little

depressions or umbilica, and giving the stem a bald, pudding-like appearance. Flowers central, short, about 1 inch across, pale yellow, with a reddish tint outside; anthers yellow; flowers usually in June. Mexico.

M. uncinata.

Stem globose, simple, about 4 inches in diameter; tubercles closely pressed against each other at the base, where they are four-angled, ¼ inch long, blue-green, apex bearing four short spines, ¼ inch long, arranged crosswise, central spine longer, yellow, and hooked. Flowers 1 inch long and wide, purple, partly hidden by the young mammæ, amongst which they appear in May and June. Mexico. Like all the species with short, angular tubercles this one is easily managed, flowers freely and profusely, and always ripens seeds. It may be grown in a frame, or even out of doors, all through the summer, removing it to a greenhouse for the winter.

M. vetula.

Stem seldom exceeding 3 inches in height by 1½ inches in diameter. Tubercles ¼ inch long, conical, with a radial crown of fine, hair-like yellow spines, ¼ inch long, and a solitary central red spine, ½ inch long. Flowers terminal, just peeping above the tubercles in May and June; sepals and petals yellow, ¾ inch long; stigma white. An old garden plant. Mexico. May be treated as recommended for *M. pusilla*.

M. villifera.

Stem 3 inches high, proliferous at the base; tubercles angular, short, woolly in the axils, and bearing four rigid, short, reddish-brown spines on the apex. Flowers pale rose, with a line of purple down the middle of each petal, developed near the top of the stem in May. Mexico. Thrives if treated as recommended for *M. pusilla*. There are several varieties, distinguished by their paler or darker flowers, or by a difference in the length and arrangement of the spines.

M. viridis.

Stem 4 inches high by 3 inches in diameter, proliferous at the base; tubercles short, four-angled, crowded in spiral rows, woolly at the base, with five or six radiating hair-like spines on the apex, and one central erect one, none more than ¼ inch long. Flowers erect, on top of stem, with recurved, pale yellow petals, 1 inch long, produced in May and June. Mexico. May be grown in a sunny frame out of doors during summer, and on a warm greenhouse shelf in winter.

M. vivipara.

Stems tufted, forming a cushion as much as 3 feet in diameter. The small tubercles are hidden by the numerous radial spines, which

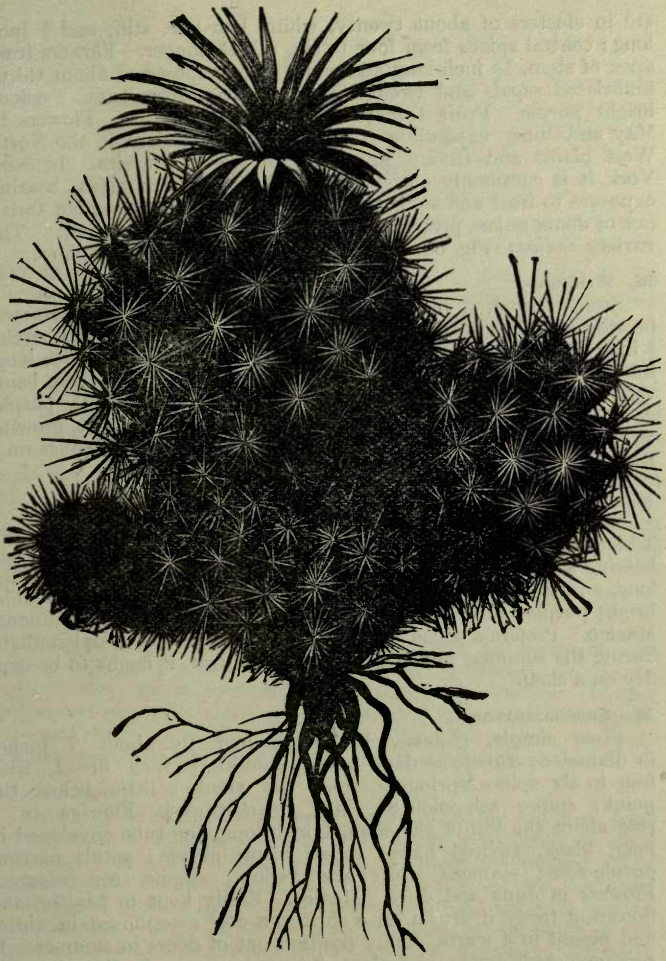

Fig. 50.—Mamillaria vivipara radiosa.

are in clusters of about twenty, white, hair-like, stiff, and ½ inch long; central spines from four to six, a little longer. Flowers from apex of stem, 1½ inch long and wide, and composed of about thirty fimbriated sepals and twenty-five to forty narrow petals; colour bright purple. Fruit ½ inch long, green when ripe. Flowers in May and June, expanding after midday. Abundant in the North West plains and Rocky Mountains of North America. In New York it is commonly cutivated as a hardy garden plant, bearing exposure to frost and snow without suffering; but it does not thrive out of doors unless protected from heavy rains in winter. The variety *radiosa* (Fig. 50) has larger flowers and shorter spines.

M. Wildiana.

Stems tufted, 3 inches high by about 2 inches in diameter, bearing spiral rows of clavate, dark green, crystallised tubercles ½ inch long, crowned with about ten radial white spines, ½ inch long, the three upper spines. and the solitary central hooked one, being yellow. Flowers small, numerous, rose-coloured, lined with purple, developed in summer. Mexico, at an altitude of 5000 feet, growing on lava and basalt, and even on the trunks of trees. Thrives on a shelf in a sunny greenhouse.

M. Wrightii.

Stem rounded, pegtop-like at the base, the top flattened, about 3 inches across; tubercles conical, ½ inch long, shining green, each bearing a tuft of six or eight straight, hair-like, white spines. ½ inch long, and two hooked central spines. Flowers 1 inch long and wide, bright purple; succeeded by egg-shaped, purple berries, 1 inch long. Mexico. Prefers a warm house and plenty of moisture and sunlight during the summer, but in winter, when at rest, it ought to be kept dry on a shelf.

M. Zuccharinіana.

Stem simple, globose, 10 inches high by about 7 inches in diameter; tubercles dark green, conical, ½ inch broad, with four to six spines springing from the areole a little below the point; spines ash-coloured, stiff, black-tipped. Flowers in a ring about the top of the stem, 1 inch long, the tube enveloped in long, black, twisted hairs; sepals brown-purple; petals narrow, purple-rose; stamens white and yellow; stigma rose-coloured. Flowers in June and July. Mexico. Easily kept in health, and flowering freely if grown on a shelf in a cool greenhouse in winter and placed in a warm, sunny position out of doors in summer. It produces seeds freely, and plants 3 inches or more in diameter may be obtained in two years from seeds. By grafting it, when young, on the stem of a Cereus or cylindrical Opuntia, a healthy, drumstick-like plant is obtained.

Chapter XIII.

LEUCHTENBERGIA.

Among the many instances of plant mimicry that occur in the Cactus family the most remarkable is the plant here figured. Remove the flower from Leuchtenbergia, and very few people indeed would recognise it as a Cactus, but would probably call it a short-leaved Yucca. In habit, in form, in leaf, and in texture it is so like a Yucca that when first introduced it was thought to be one by the Kew authorities until it flowered. The leaf-like tubercles are sometimes longer and narrower than in Fig. 51. Leuchtenbergia bears its flowers on the ends of these tubercles, a peculiarity which leads one to infer that tubercles are modified branches, the spines representing the leaves. Some species of Mamillaria and Echinocactus develop young plants from the tops of their tubercles, which also supports this theory. In Leuchtenbergia, the tubercles fall away as the plant increases in height, leaving a bare, woody stem similar to that of a Yucca.

Cultivation.

Leuchtenbergia has always been difficult to cultivate. It thrives best in a warm, sunny house during winter, and in an exposed, airy, warm position under glass during summer. It may be watered regularly whilst growing—that is, from April to September—and kept quite dry all winter. The soil should be well-drained loam, and the roots allowed plenty of pot room.

Propagation.

This may be effected from seeds, or by removing the head from an old plant in spring, and placing it under a bell-glass to root, watering it only about once a week till roots are formed. The beheaded stem should be kept dry for about two months, and then watered and placed in a sunny, moist position, where it can be syringed once a day. It should then form buds on the edges of the persistent parts of the tubercles. They first appear in the form of tiny tufts of yellowish down, and gradually develop till the first leaf-like tubercle appears. When large enough, the buds may be removed and planted in small pots to root. If an old plant is dealt with in this way in April, a batch of young ones should be

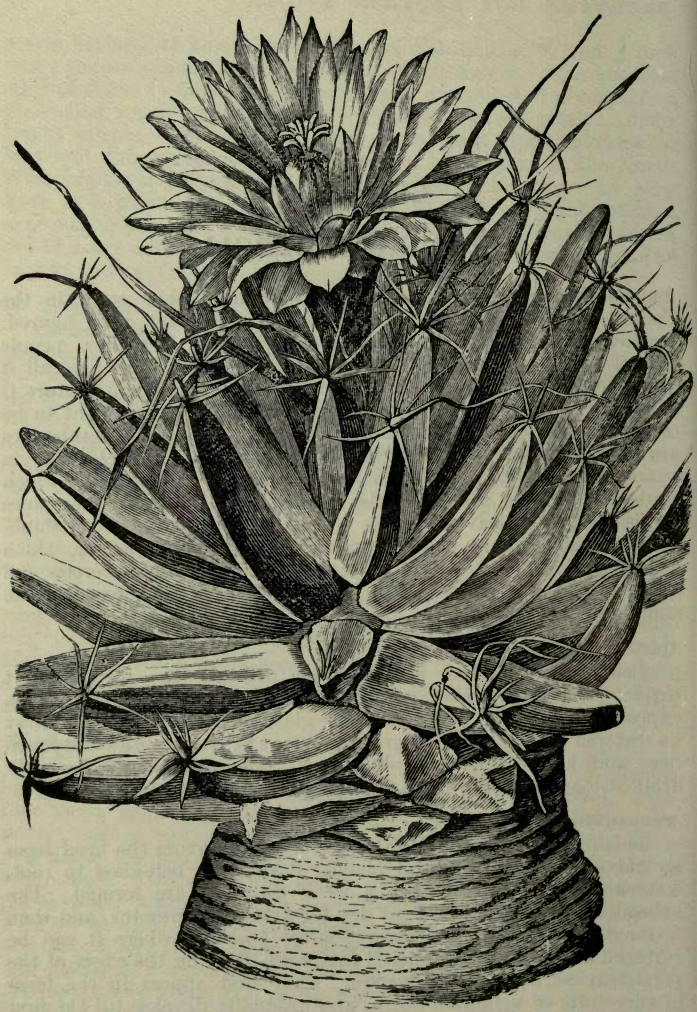

Fig. 51.—Leuchtenbergia principis.

developed and rooted by October. When sick, the plant should be carefully washed, all decayed parts cut away, and then planted in sandy loam and kept in a stove temperature.

L. principis.

This, the only species known, was introduced from Mexico to Kew in 1847, where it flowered the following year. The plant attains a height of 1 foot or more, with a head of leaf-like tubercles from 3 to 6 inches long, grey-green in colour, succulent, with a tough skin, triangular, and gradually narrowed to a blunt point, upon which are half a dozen or more thin, flexuous, horny filaments, the central one 5 inches long, and the others about half that length. The flowers are borne on the ends of young, partly-developed tubercles, near the centre of the head; they are erect, tubular, 3 to 4 inches long, scaly, the numerous sepals and petals forming a flower of the ordinary Cactus type, 4 inches across, and of a rich yellow colour. The anthers form a column in the centre, through which the nine-rayed stigma protrudes. Strong plants sometimes produce two flowers together.

Chapter XIV.

PELECYPHORA.

LIKE Leuchtenbergia, this genus is rare, difficult to cultivate, and is exceptionally interesting in structure. It is closely related to Mamillaria; indeed, it was formerly included in that genus. It differs, however, in the form of its tubercles, which are hatchet-shaped, and cleft at the apex, where each division is clothed with small, horny, overlapping scales, not unlike the back of a wood-louse—hence the specific name. The plants are collected and sold in the drug market under the name of "peyote."

Cultivation.

The plant grows very slowly, specimens such as that represented in our illustration being many years old. Healthy plants, freshly imported, may grow for a few months and then suddenly die, the inside of the stem rotting, whilst outside it looked perfectly healthy. Probably it would thrive better if grafted on the stem of some dwarf Cereus or Echinocactus.

Propagation.

This is easiest effected by means of seeds, which, however, are not readily obtained. The first plants sent to this country were dead on arrival, but a few seeds were found in a withered fruit on one of the dead stems, and from these young plants were raised.

P. aselliformis.

The size, habit, and structure of this plant are so well represented in the figure that little description is necessary. The stems are simple till they get about 3 inches high, when they produce offsets about the base, which may either be removed to form new plants, or allowed to remain. The flowers, which are large for the size of the plant, are developed freely in the apex of the stems in the early part of the summer. The sepals and petals are in four series, the outer pale purple, the inner deep purple; stamens numerous; stigma with four erect lobes. First cultivated in Berlin in 1843, but the flowers were not known till 1858. There are several varieties, viz., *concolor*, distinguished by the whole flower being deep purple; *pectinata* with larger scales (spine-tufts); and *cristata*, a cockscomb or crested form. Mexico. (Fig. 52.)

Fig. 52.—Pelecyphora aselliformis.

Chapter XV.

OPUNTIA.

THERE are over one hundred species of Opuntia known, all of them natives of the American Continent and the West Indies, though a considerable number have become naturalised in other parts of the world. They are, with few exceptions, easily distinguished from all other Cacti by their stems and spines, and by the structure of their flowers. They vary in size from small, trailing, many-branched plants, 6 inches in height, to large shrubs 30 feet high. Generally the branches are flat when young, and shaped like a battledore, the joints varying considerably in size and shape, but in some species they are round, as in *O. cylindrica*, *O. subulata*, *O. arborescens*, &c. All have fleshy stems, which ultimately become cylindrical and woody. When young they bear small fleshy leaves, which fall off at an early stage; the spines are altered in length and number as the stems get old; in several species the spines fall away as the joints begin to harden; in *O. subulata* the leaves are large and persistent.

The spines of Opuntias are barbed and often very formidable, and they are so sharp that they readily pierce the skin. Once in they are difficult to get out; the very fine ones can only be shaved level with the skin, and left to grow out, whilst the larger must be cut out if they have penetrated to any depth. This horrid character in Opuntias has been turned to good account in our Colonies, where they are used as fences. A hedge of such kinds as *O. Tuna* or *O. horrida* is absolutely impassable to both man and beast, and as the stems are too watery to be easily destroyed by fire, their usefulness in this way could not be surpassed. When an island in the West Indies was divided between the French and English, the boundary was marked by three rows of *O. Tuna*. They will grow in the poorest of soils, and even on bare rocks.

Notwithstanding their spines, Opuntias are used as fodder for cattle, particularly in the Southern States of North America. Where they have been introduced they have too often become very troublesome to farmers, and notwithstanding the value of their fruit, known as Indian Fig or Prickly Pear, large rewards have

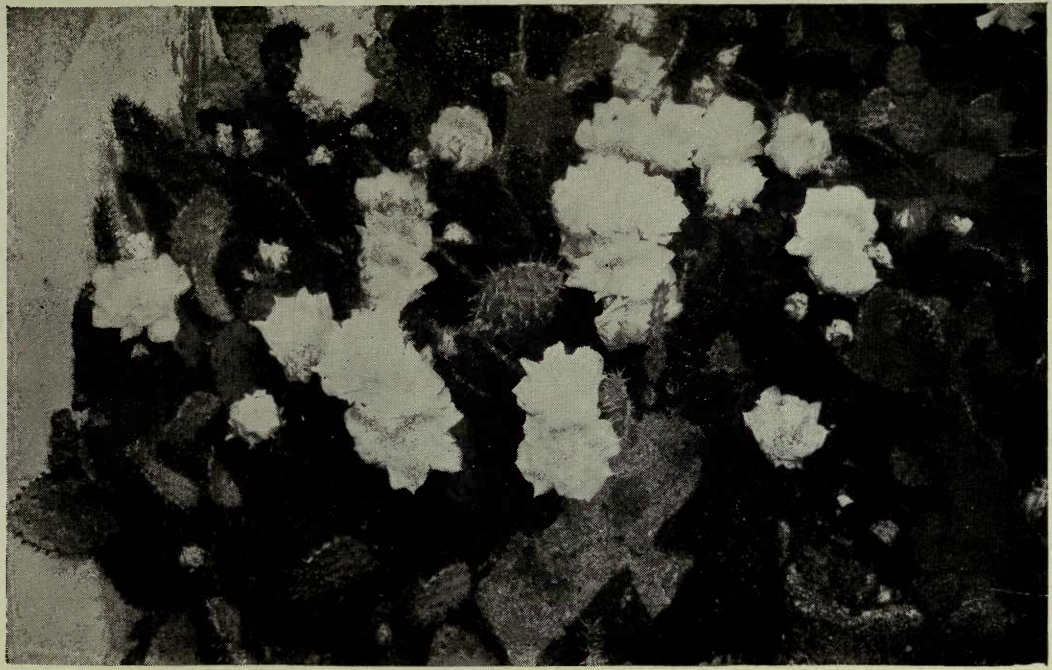

Photo by] [*C. P. Raffill.*

Opuntia mesacantha (Hardy).

been offered for a practicable method of exterminating them where they have taken complete possession of large areas of good land.

Cochineal was formerly obtained from a species of plant-bug which was cultivated on two species of Opuntia in the Canary Islands.

The flowers of Opuntias are as a rule attractive. In many species they are large and well-formed, tawny-yellow, greenish-white, or dull red. They cannot, however, be recommended for their floral beauty, although it is probable that the same flowers on plants of more pleasing appearance would be admired. There are a few exceptions to this, *O. Rafinesquii*, *O. missouriensis*, and *O. basilaris*, bearing numerous large, brightly-coloured flowers. The fruits of some of them are edible, and to some palates agreeable. Others find them mawkish and insipid, like poor gooseberries. Sir Joseph Hooker has compared them to Pumpkins. They are pear-shaped, with a thick rind, green, yellow, or red pulp, and small, hard seeds imbedded in it.

The fruit of Opuntia consists of a branch, or joint, modified in form, and bearing on its flattened apex a flower. After becoming fertilised, the ovary grows down into the joint, and ultimately the whole joint is changed into a succulent, juicy and sometimes edible fruit. By planting the unripe "fruit" of Opuntias in pots of sandy soil, and treating them as cuttings, they will develop buds at the apex and roots at the base, ultimately forming plants.

The vitality in the branches of most of the species is very great, the smallest portion, as a rule, emitting roots and developing into a plant in a short time. The branches are soft, and easily broken, so that, in gathering the fruits, many pieces are broken off and left, these grow into plants, and in a short time an extensive colony of Opuntias is formed. The seeds, too, are a ready means of increase, being distributed by birds and other animals which eat the fruits. It is in consequence of this that Opuntias introduced into some of our Colonies have become as difficult to deal with as the rabbit scourge in Australia. In English gardens, however, there is no danger of this. The ease with which they may be grown and propagated, render their management an easy matter. When placed among other plants, Opuntias have a striking effect.

The more robust kinds of Opuntia may be used as stocks for grafting, and very odd-looking specimens may be obtained by making the most of this fact. One of the crested or monstrous forms, when grafted on a flat-stemmed Opuntia, presents the appearance of a large green cockscomb growing out of the top of a battledore-like stem. Equally odd combinations may be made by grafting flat-stemmed on cylindrical. They unite with the greatest ease, the time most favourable for grafting being April. For directions for grafting Cacti, see Chapter III.

O. arborescens.

Known as the Walking-Stick or Elk-Horn Cactus, from its cylindrical, woody stems being made into curious-looking walking-sticks, whilst the arrangement of the branches is suggestive of elk horns. Stems cylindrical, branching freely, and forming trees from 8 to 30 feet high. They are covered with oblong tubercles and tufts of long, needle-like spines. Flowers on the young branches 3 inches in diameter, bright purple, developed in June. Mexico. Requires greenhouse or stove treatment. The skeletons of this species, as seen scattered over the desert places where it is wild have a startling appearance. They stand quite devoid of leaves, spines, or flesh, nothing remaining except a hollow cylinder, perforated with holes, where the small branches had been. These skeletons are said to stand many years.

O. arbuscula.

Stem cylindrical, solid, woody, about 4 inches through, clothed with smooth green bark; height 7 or 8 feet. Branches numerous, slender, copiously jointed, the ultimate joints about 3 inches long and $\frac{1}{2}$ inch thick, slightly tuberculated, bearing tufts of spines 1 inch long. Flowers produced in June $1\frac{1}{2}$ inches in diameter, greenish-yellow, tinged with red. Mexico. A very remarkable plant, the thin branches, with their hundreds of long whitish spines, being striking. Unfortunately, it is not easily grown. It requires stove treatment.

O. arenaria.

Sand loving. Stems spreading, forming a tuft 3 feet through and about 1 foot high. Joints $1\frac{1}{2}$ to 3 inches long, terete, with very prominent tubercles and numerous tawny bristles, 1 to $1\frac{1}{2}$ inches long, shorter ones hair-like and curled. Flowers 2 inches in diameter, produced in May. Fruit 1 inch long, bearing a few short spines. Mexico. A stout-rooted plant, which should be grown in loose, sandy soil. It thrives best when planted out on a stage near the glass in a stove.

O. Auberi.

Erect, 8 feet or more high, not unlike *O. Ficus-indica* in the form of its joints, but with long spines springing from the cushions, whereas the latter has none. The joints are oblong-ovate, glaucous-green, the cushions few and scattered; spines white, flattened, of various lengths. Flowers tawny-yellow, small for the size of the plant. Cuba. Requires stove treatment. Being very brittle, this plant should be supported with stakes.

O. aurantiaca.

Stem dwarf, cylindrical, branching freely. Joints short, $\frac{3}{4}$ inch in diameter; spines reddish, one about 1 inch long, the others shorter, set in cushions of white wool. Flowers bright orange,

3 inches across. Chili, whence it was introduced in 1824. Should be grown in a warm greenhouse all winter, and placed in a sunny position outside during summer.

O. basilaris.

Stem short, branching into a number of stout, obovate joints, usually springing from a common base, and curving inwards, suggesting an open cabbage. They are 5 inches to 8 inches long, about ½ inch thick, covered all over with little cushions of very short, reddish spines, set in slight depressions or wrinkles. Flowers rose purple, 3 inches in diameter, produced in May. Mexico. Easily

Fig. 53.—Opuntia basilaris.

kept in health in an ordinary stove temperature. It varies in the form of its joints and in its manner of branching, but it seems never to develop the joints one on the top of the other, as do most Opuntias. It is one of the best garden Opuntias. (Fig. 53.)

O. Bigelovii.

Stem cylindrical, stout, woody, bearing a dense head of branches. Joints 2 to 6 inches long, 1 to 2 inches in diameter, light green, covered with small tubercles and little spine-cushions, spines 1 inch long. When wild, the young joints are often shaken off by the wind, and cover the soil around, where they take root or stick to the clothes of the passers-by, like burrs. Flowers not known. Mexico, where it forms a tree 12 feet high. The skeleton of the

trunk is a hollow cylinder, perforated with numerous holes, which occur in a regular spiral. The appearance of a full-grown specimen is very striking, the oval joints, thickly covered with needle-like spines, hanging in clusters, more suggestive of spiny fruit than branches. Requires stove treatment.

O. boliviana.

Stem 1 foot high, gouty, erect, branches composed of roundish, pale green joints, with small, round tubercles, and long, white, flexible spines, sometimes as much as 4 inches in length;

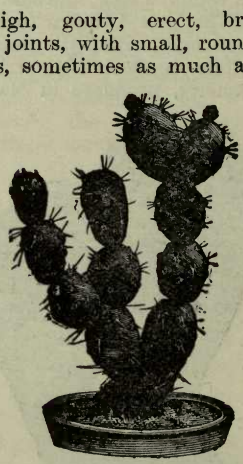

Fig. 54.—Opuntia boliviana.

cushions about 1 inch apart. Flowers 1½ inches across, yellowish. Bolivia. It often assumes a yellow hue even when in good health. Requires stove treatment. (Fig. 54.)

O. brachyarthra.

A dwarf-growing species, stem with short, tumid joints from 1 to 2 inches thick. The shortness of the joints, together with their growing on the top of each other, has been not inaptly compared to a jointed finger. Cushions close together, composed of short, white and yellowish bristles, and stout, terete spines, 1 inch or more long, set on little tubercles. Flowers 1 inch in diameter, with about five sepals, nine petals, and a five-rayed stigma; they are borne on the topmost joints. New Mexico. May be grown in the open, also in the cool greenhouse. (Fig. 55.)

O braziliensis.

Stem straight, erect, slender, firm and stiff, from 10 to 30 feet high, tapering from the base upwards, and furnished all the way up with short, horizontal branches, candelabrum-like. Spines long,

subulate, very sharp, ash-coloured, in clusters. Joints broadly oblong, resembling leaves, or the thin, leaf-like joints of a Phyllocactus, with the addition of long, whitish spines on both sides. Flowers 1½ inches in diameter, lemon-yellow, freely produced on the younger joints in May and June. Fruit as large as a walnut, spiny, yellow when ripe. Brazil, whence it was introduced in 1816. Grows freely, in a warm, airy greenhouse, and forms a striking object. Its fruits are edible.

O. candelabriformis.

Stems erect, 5 to 8 feet high; joints flat, almost circular, about 6 inches in diameter, glaucous-green, densely clothed with numerous cushions of white, bristle-like spines, a few in each cushion being long and thread-like. Flowers not known. Mexico. Succeeds if planted on a little rockery or raised mound in a warm house, where it branches freely and forms a dense mass of circular joints. One of the best of the larger Opuntias.

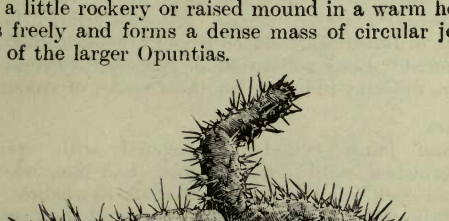

Fig. 55.—Opuntia brachyarthra.

O. clavata.

Stem short; joints club-shaped, 2 inches long and 1 inch wide narrowed almost to a point at both ends. Cushions ¼ inch apart, composed of numerous bristle-like flattened spines. Leaves ¼ inch long. Flowers yellow, 1½ inches across. Fruit 1½ inches long, covered with stellate clusters of white, bristle-like spines, lemon-yellow when ripe. New Mexico. Requires warm-house treatment.

O. cochinellifera.

Stems erect, attaining a height of 9 feet or more, branching freely, becoming woody and cylindrical; young joints flat, oblong-ovate, varying in length from 4 inches to 1 foot, deep green, rather soft and watery, spineless, the cushions distant, and sometimes bearing a few very short bristles. Flowers at the extremities of the joints, 1½ inches long, composed of numerous imbricating, scale-like petals, curving inwards, and coloured crimson. Fruit flat-topped, 2 inches long, red; pulp reddish; seeds black. South America, whence it was introduced in 1688. Requires tropical

treatment. Interesting as being the plant employed in the cultivation of cochineal. It is one of the easiest to manage, requiring a rather dry atmosphere, plenty of light, and a temperature not lower than 50 deg. in winter.

O. corrugata.

Stem not more than 2 feet high; joints cylindrical, wrinkled all over, about 2 inches long, covered with cushions of white hair or bristle-like spines. Flowers 1½ inches across, reddish-yellow, produced in August. May be grown in an ordinary greenhouse, on a shelf near the glass, and exposed to full sunshine.

O. curassavica.

Branches short, spreading; joints club-shaped, dark green, bearing numerous cushions of bristles, and long, white, very sharp-pointed spines. Flowers 3 inches across, greenish-yellow, borne on the young joints in June. Introduced from Curassoa in 1690. Requires stove treatment. Long cultivated in gardens. Several varieties of it are known, differing in habit, length of spine, or colour of flower.

O. cylindrica.

Stem and joints cylindrical, covered with spindle-shaped tubercles, crowned with tufts of fine, hair-like, whitish spines, one or two in each tuft being stiff, and sharp as needles. The leaves are fleshy, cylindrical, 1 inch or more long, and they remain on the plant longer than is usual in Opuntias. Flowers crowded on the ends of the branches, each 1 inch in diameter, scarlet, developed in June. Said to grow to a height of 6 feet or more in its native habitat, but under cultivation it is rarely seen more than 3 feet high. Introduced in 1799. It requires stove treatment, but rarely flowers under cultivation. *Var. cristata* has cockscomb-like stems, with the leaves and white hairs growing all along the top of the comb.

O. Davisii.

Stems somewhat horizontal, 1½ feet in height; joints 4 to 6 inches long, ¾ inch thick; tubercles not prominent, bearing cushions of very slender bristles, forming a kind of brush, from amongst which the spines spring. Longest spines 1½ inches, covered with a loose glistening sheath. Flowers 2 inches in diameter, greenish-brown. New Mexico, introduced 1883. It forms a compact, shrubby plant, if kept in an intermediate house during winter, and placed in the open in full sunshine during summer. It is named after Jefferson Davis, the American Statesman.

O. decumana.

The largest species known. At Kew it is represented by a plant 12 feet high (it would grow still taller if the house were higher). Stem hard, woody, brown-barked, bearing an enormous head of

elliptical, flat joints, 12 to 20 inches long, and about 1 foot broad, smooth, grey-green, with a few scattered cushions of very tiny bristles, and sometimes, though rarely, a spine or two. Flowers large, orange-coloured, produced in summer. Fruit over 4 inches long, spiny, brownish-red, very watery when ripe; flesh red, sweet. Brazil. Requires stove treatment. This is said to be what is known in Malta as the Indian Fig.

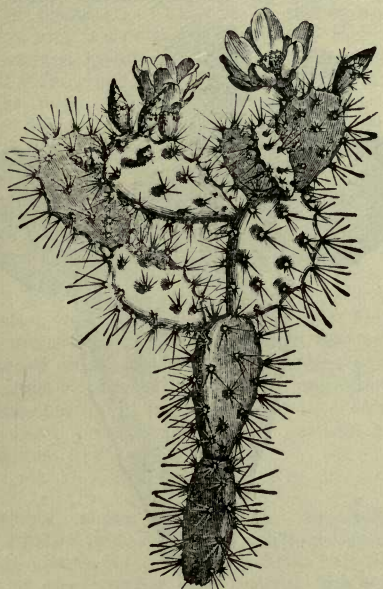

Fig. 56.—Opuntia Dillenii.

O. diademata.

Small, with a short, erect stem, composed of globose, superposed joints, grey-green in colour, and very succulent. Cushions large, about 1 inch apart, furnished with a tuft of short, grey hairs and short spines, with a large one at the base. The character of this spine is exceptional, being broad, flat, cartilaginous, whitish, curving downwards, and on large examples 2 inches long, and ¼ inch wide. Flowers and fruit not known. Mendoza (La Plata). Requires a warm greenhouse or stove. Examples of it in cultivation over ten years are only 4 inches high.

O. Dillenii.

Stems erect, robust, attaining a height of 15 feet, with flattened, ovate joints, about 5 inches long by 3 inches broad. Cushions composed of short, white, hair-like bristles, and numerous long, stout, yellow spines. Flowers yellow, tinged with red, 4 inches in diameter, freely produced on the ends of the youngest joints all summer. Fruits similar to those of *O. Ficus-indica*. West Indies, but naturalised in many warmer parts of the world. In India it is

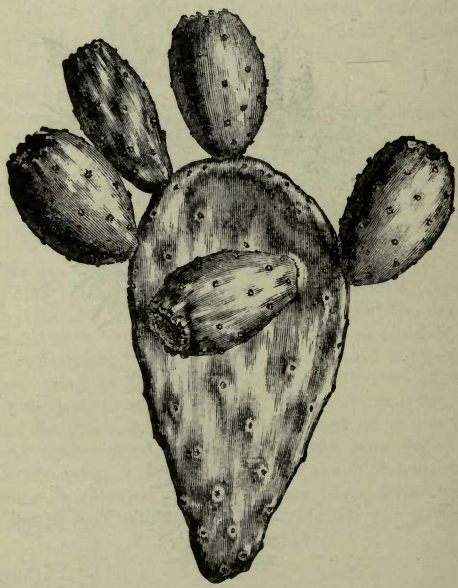

Fig. 57.—Fruiting Branch of Opuntia Ficus-indica.

so plentiful and widespread that it has been supposed to be a native. There it is often planted as a hedge, and its fruits are eaten by the poor. It is a great pest in the open lands of that country, large sums being annually expended in cutting it down and burying it. Is also employed in the cultivation of cochineal. Requires warm greenhouse treatment. (Fig. 56.)

O. Emoryi.

Stems prostrate, spreading, less than 1½ feet high. Joints cylindrical, curved, 4 inches long, 1½ inches thick. Tubercles very prominent, crowned with pea-shaped cushions of short bristles,

and numerous radiating spines, some of which are fully 2 inches long, very strong and needle-like. Flowers 2½ inches in diameter, sulphur-yellow, tinged with purple, produced in August and September. Mexico, on dry, sandy soils. Requires warm greenhouse treatment.

O. Engelmanni.

Stems stout, 6 feet high, joints woody, flat, green, 1 foot long and 9 inches in diameter. Cushions 1½ inches apart, composed of coarse bristles, and one or two spines over 1 inch long. Flowers 3 inches in diameter, yellow, produced in May and June. Fruit nearly round, 2 inches long, purplish both in rind and pulp, rather nauseous to the taste. Mexico. Cultivated in a greenhouse, it grows freely and flowers annually. According to American botanists, it is probably the most widely spread of the whole Cactus tribe.

O. Ficus-indica.

Stems erect, 8 to 12 feet high ; joints flat, oval or obovate, about 1 foot long and 1 inch thick ; cushions 1½ inches apart, composed of short, yellowish bristles, and very rarely one spine. Flowers 3 to 4 inches across, sulphur-yellow, produced all through the summer. Fruit 3 to 4 inches long, pear-shaped, covered with tufts of bristles, white, yellow, or red when ripe. Central America, whence it was introduced into Europe about 300 years ago. It is now widely spread in tropical and temperate regions. The fruit is often eaten, and it may be seen sometimes offered for sale by fruiterers in this country. Best cultivated in a sunny greenhouse during winter, and placed outside in a position exposed to full sunshine in summer. (Fig. 57.)

O. filipendula.

Stems prostrate, about 1 foot high, spreading ; joints flat, round or oval, about 3 inches long, often less, milky-green in colour. Cushions ½ inch apart, composed of a little tuft of white woolly hair, a cluster of erect, rather long bristles, like a small shaving-brush, and all pointing upwards ; spines usually only one in each cushion, slender, deflexed, white, 1 to 2 inches long. Sometimes the joints are wholly spineless. Flowers 2½ inches in diameter, purplish, handsome, produced in May and June. The roots bear tubers several inches in length, which will grow into plants if severed and planted. Mexico. Requires stove treatment. (Fig. 58.)

O. frutescens.

Stems thin, copiously-branched. Joints almost continuous, from 2 to 6 inches long, ¼ inch thick, bearing small tufts of hair and long central spines often exceeding 2 inches in length, and, when young, enclosed in a thin, bony sheath. Flowers 1 inch across, greenish-yellow, produced in June. Fruit 1 inch long, pear-shaped,

smooth, scarlet, with tufts of bristles all over it. Mexico. An interesting pot-plant, which should be grown in a warm greenhouse.

O. horrida.

Stems erect, stout, with flattened, green joints, about 5 inches long by 3 inches wide. Cushions 1 inch apart, composed of short, reddish bristles, and long, tawny red spines, about eight in each cushion, and of a peculiarly ferocious appearance—hence the specific name. Mexico. Requires warm-house treatment.

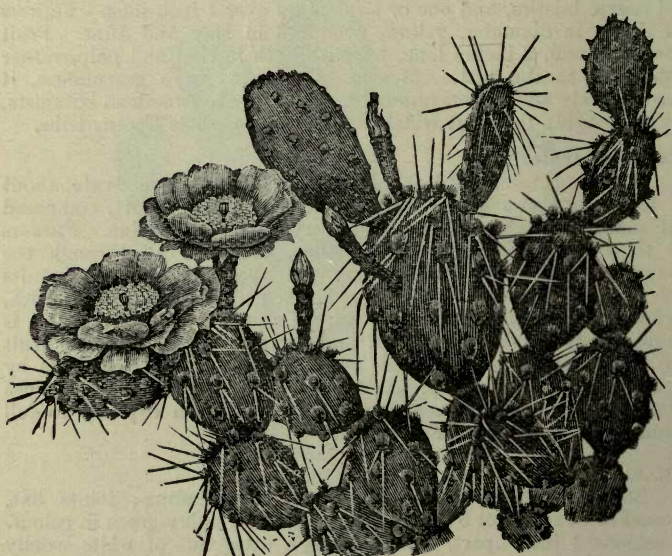

Fig. 58.—Opuntia filipendula.

O. hystricina.

Stems tufted in habit, the joints 3 to 4 inches long and broad; cushions ½ inch apart, rather large, with numerous spines, varying in length from ½ to 4 inches, and short, yellowish bristles. Flowers large, yellow. Fruit 1 inch long, spiny. San Francisco. Probably hardy in this country.

O. invicta.

A low branching plant, with joints 4 inches long and 3 inches thick, with star-like tufts of about twenty flattened spines. the stoutest 2 inches long. Flowers yellow, abundant, 2 inches across;

fruit covered with reddish spines. California. "It may be a *Cereus*, but it groups well enough with *O. Schottii* to be retained for the present in Opuntia" (Coulter).

O. leucotricha.

Stem erect, with flattened, ovate, or oblong joints, bearing numerous cushions of short bristles, and a large central spine. The spines increase in length with age, and become curled and

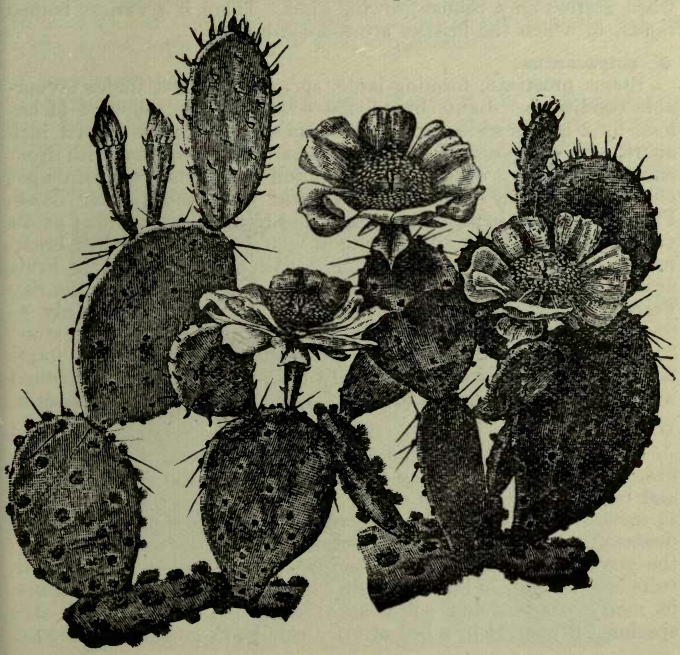

Fig. 59.—Opuntia macrorhiza.

hairlike. Young plants have small, subulate leaves of a bright red colour, whilst old examples are almost as interesting as the Old Man Cactus (*Pilocereus senilis*). Flowers yellow, produced in June. Mexico. Requires stove treatment.

O. macrorhiza.

Stems prostrate; joints flat, oval, clothed with clusters of bristles and spines; roots fleshy, potato-like. Habit and flowers resembling

O. Rafinesquii. Thrives in a sunny position out of doors where it can be protected from frost and excessive wet. It flowers in early summer. (Fig. 59.)

O. microdasys.

Stem short, with flattened joints, which are nearly circular in outline, and are covered with little cushions of bright orange-yellow bristles. Mexico. Thrives in a warm greenhouse. Grows best when grafted on a robust-growing kind. There is a variety named *rufida*, in which the bristles are reddish-brown.

O. polyacantha.

Stems prostrate, forming large, spreading masses under favourable conditions. Joints broad, flattened, obovate, about 4 inches long by 2 inches wide, light green; spine-cushions less than 1 inch apart, and composed of numerous small, white spines, with from one to four longer ones; these latter fall away when the joints get old. Leaves very short, with a little wool about their bases. Flowers 3 inches in diameter, appearing from May onwards; petals yellow, dashed with rose, sometimes wholly rose-coloured or brick-red. Stamens deep red; pistil yellow, with a conical stigma. Fruit nearly round, spiny, about 2 inches long. Wisconsin and the San Francisco Mountains; introduced in 1814. This is as hardy as *O. Rafinesquii*, and thrives under similar treatment. It has stood 22 deg. of frost in this country. In North America, where it forms large, spreading masses on gravelly hillsides, it is usually covered with snow from Christmas to May. There are several varieties of it.

O. monacantha.

Stems robust, not unlike *O. Dillenii* in general habit. Joints flat, large, oblong or ovate in outline, rather thinly compressed, and bearing grey cushions over 1 inch apart, with a solitary spine, 1½ inches long, spring from the centre of each cushion, and pointing downwards. Flowers sulphur-yellow, 2½ inches across, borne on the young joints in May. Fruits ovate, 2 inches long, green, with tufts of short, brown bristles; pulp edible. Brazil, but now common in many tropical and sub-tropical countries. It forms a large specimen if planted in a bed of brick-rubble, in a warm greenhouse.

O. nigricans.

Stem stout, erect, hard and woody when old. Joints flat, oval 5 to 8 inches long. Cushions 1½ inches apart, composed of short reddish-brown bristles and two or three long stout spines, which are yellow when young, but almost black when ripe. Flowers produced in August on the young, ripened joints, orange-red, about 3 inches across. Fruit pear-shaped, crimson when ripe. Brazil. Thrives in a warm greenhouse. At Kew a large specimen 12 feet high, with an enormous head, had to be cut down because of its top-heaviness. Its head was planted as a cutting.

O. occidentalis.

Stem stout, branches wide-spreading, often bent to the ground. Joints 9 to 12 inches long by about 6 inches broad, flattened. Cushions nearly 2 inches apart, with small, closely-set bristles and straight spines, from ½ to 1½ inches long. Flowers produced in June on the ripened joints, nearly 4 inches in diameter, orange-yellow. Fruit 2 inches long, "very juicy, but of a sour and disagreeable taste." A striking plant when allowed sufficient space to develop. It should be planted in a bed of rough, stony soil, in a dry greenhouse. Probably hardy. California.

O. papyracantha.

Stem egg-shaped, 3 inches long, branched, the surface broken into hump-like tubercles, grey-green, each crowned with a tuft of short brown bristles, and two or three flat thin cartilaginous paper-white appendages, which are neither leaves nor spines nor sheaths, but probably modifications of the latter; they are from 1 to 3 inches

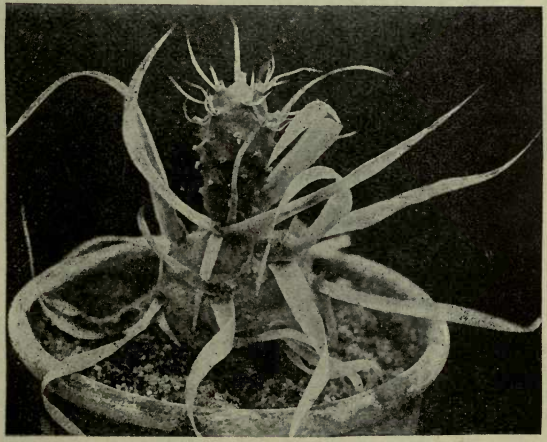

Fig. 60.—Opuntia papyracantha.

long, ¼ inch wide at the base, tapering to a fine point, the margins more or less ragged. (Syn. *O. plumosa nivea.*) This is one of about half a dozen species characterised by flattened spines, and which form the group called *Platyacantha.* They are all natives of the Argentine Republic. (Fig. 60.)

O. Rafinesquii.

A low, prostrate, spreading plant, seldom exceeding 1 foot in height, the main branches pressed along the ground, the younger

ones erect. Joints flat, obovate, 5 inches long by 3 inches in width, fresh green in colour; spines very few, mostly only on the upper edge of the last-made joints, 1 inch long, straight, whitish, soon falling off; cushion composed of very fine reddish bristles and whitish wool; leaves very small, falling early. Flowers 2 to 4 inches in diameter, bright sulphur-yellow, reddish in the centre. Produced in great abundance from July to September on the margins

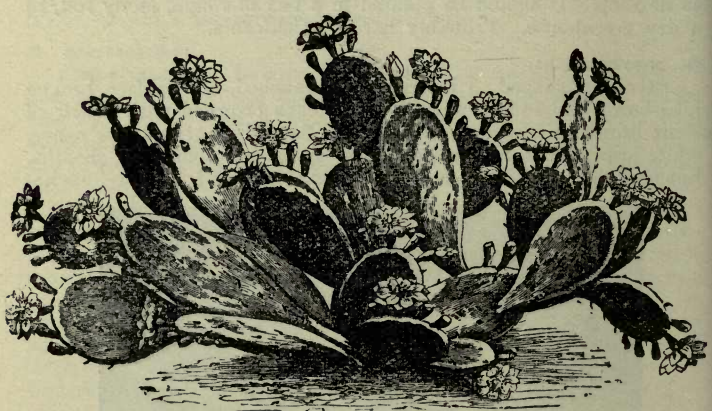

Fig. 61.—Opuntia Rafinesquii.

of the younger joints. Fruit pear-shaped, 1½ to 2 inches long, spineless, edible, somewhat acid and sweet. Wisconsin to Kentucky, and westward to Arkansas and Missouri. An ornamental interesting plant for outdoor cultivation, and when once established it gives no trouble. For the first year or two after planting it requires watching, as, until the basal joints harden and become woody, they are liable to rot in wet weather. A large-flowered form of it is known as *grandiflora*. (Fig. 61.)

C. ramosissima.

A bushy plant, 2 to 6 feet high, with a thick stem, dark grey scaly bark, the branches clothed with ash-grey tubercles, each bearing a small tuft of wool and a stout straight yellow spine, 2 inches long, enclosed in a loose yellow sheath. Flowers 2 inches across, purple. The curiously-angled tubercles and long yellow spines give the plant a striking appearance. California, &c. (Syn. *O. tessellata.*) There is a crested form of it.

O. Salmiana.

Stem erect, branching freely. Joints from 1 to 6 inches long, cylindrical, smooth, ½ inch in diameter, clothed with small cushions of soft, short bristles, and one or two longish spines. Flowers produced in September, 2 inches across, yellow, streaked with red, of short duration. Fruit egg-shaped, 1 inch long, crimson. Brazil, whence it was introduced in 1850. Thrives in a warm greenhouse. A charming little Cactus, and exceptional among Opuntias in the colour and abundance of its flowers, and fruits, which usually remain on the plant several months. A small branch, or joint, grows to its full length, and a flower-bud appears in the apex. If examined at this stage, it will be seen that the ovary occupies only a very shallow cavity in the top of the branch. After flowering, this ovary grows into the branch, and ultimately the whole branch is transformed into a pulpy fruit. Many of the small branches, although they do not flower, change to a red colour like the fruits.

O. spinosissima.

Stem erect, woody. Joints very flat and thin, deep green, ovate or rotund, from 6 inches to 1 foot long. Cushions 1 inch apart. Bristles very short. Spines in clusters of about five, the longest 2 inches in length, brownish-yellow. Flowers reddish-orange, small, usually only 2 inches across, produced in June. South America; naturalised in many parts of the Old World. Requires stove treatment.

O. subulata.

Stem erect, cylindrical, even below, channelled and tubercled above, 2 inches in diameter. Joints long, cylindrical, with tufts of short, white hair on the apices of the tubercles, and one or two white, needle-like spines from ¼ to 1 inch long. At the base of each tuft, from the apex to 1 foot or more down the younger branches, there is a fleshy, green, awl-shaped leaf, from 2 to 5 inches long. Ultimately the leaves and spines fall away, the tubercles are levelled down, and the mature stem is regular and cylindrical, with tufts of white setæ scattered over it. Flowers produced in spring; sepals 2 inches long, green, deciduous; petals small, dull purple. Fruit pear-shaped, 4 inches long; seeds ½ inch long and wide. South America. Formerly known as a Pereskia from the fact of its leaves being persistent and very large. Easily grown in a warm greenhouse.

O. tetracantha.

Allied to *O. arborescens*, but never more than 5 feet high, with cylindrical joints covered with prominent tubercles, bearing tufts of brown bristles and straw-coloured, flattened, deflexed, loosely-sheathed spines. Flowers greenish-purple; fruit ovate, bright red. Arizona. Like all the plants of this set, *O. tetracantha*

may be made to form a compact shrub, and when in flower or fruit it is very ornamental.

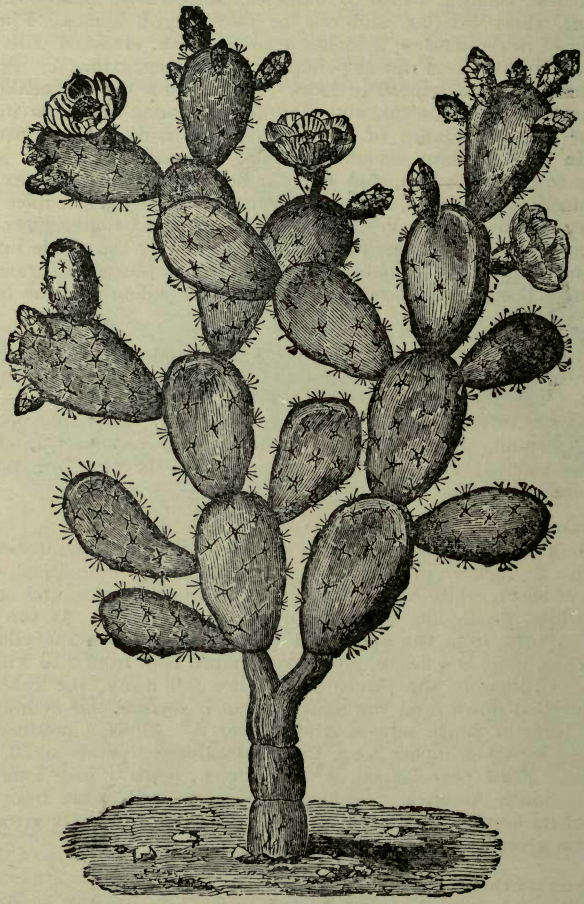

Fig. 62.—Opuntia Tuna.

O. Tuna.

Stem erect, flat-jointed, robust-growing, sometimes 20 feet high. Joints ovate, 4 to 9 inches long, with cushions 1 inch apart, composed of short, fulvous bristles, and several long, needle-shaped,

unequal, yellowish spines. Flowers borne on the upper edges of the last-ripened joints, 3 inches across, reddish-orange, produced in July. Fruit rich carmine, about 3 inches long, pear-shaped. West Indies. Introduced in 1731. (Fig. 62.)

O. tunicata.

Stem sub-erect, cylindrical. Joints club-shaped, variable in length, 2 inches in diameter. When young the surface is covered with oblong tubercles, each bearing a small cushion of whitish, short hairs, and about half a dozen white spines, unequal in length, the longest stout, and inclosed in a hard sheath, which becomes broken and ragged when old. Mexico. Introduced in 1840. It requires stove treatment.

O. vulgaris.

A low, prostrate, spreading plant. Joints short, oval, flattened, thicker than in *O. missouriensis*, 3 inches long by about 2 inches broad. Spine-cushions ¾ inch apart; tufts very small, with occasionally, a long spine. Leaves fleshy, small. Flowers 2 inches across, pale sulphur-yellow; produced freely in June. Fruits nearly smooth, 1½ inches long, brown when ripe, with a strong disagreeable odour. Mexico to New York, usually near the coast. Now common in many parts of Europe. In Madeira it has taken possession of large areas and is perfectly at home there. In England it was cultivated by Gerard some 300 years ago. It grows freely in stony soil, exposed to full sunshine, in a sheltered position outside, where it will creep along the ground, and root all along its stems, which rarely rise more than 6 inches from the ground. This and *O. Ficus-indica* have been confused by some authors.

O Whipplei.

Stem usually prostrate, with slender, elongated branches, which are cylindrical when old, broken up into short joints when young. Joints varying in length from 2 inches to 1 foot, 1 inch in diameter. Cushions small, round. Spines white, variable in number, and arranged in tufts on the ends of the tubercles, one being 1 inch long, the others shorter. Flowers nearly 2 inches in diameter, red, borne in a cluster on the ends of the last-ripened joints in June. Fruit 1 inch long, with a cavity in the top. Mexico. Requires stove treatment. Is related to *O. arborescens*, from which, however, it is easily distinguished by the latter having a stout central spine and numerous radiating ones.

Chapter XVI.

PERESKIA.

The Pereskias differ so markedly from all other kinds of Cacti, that at first sight one can scarcely believe they are true Cacti, closely related to Cereus and Epiphyllum. They have erect or trailing stems and branches, and usually form dense, large bushes; the branches are woody and thin, and bear large, laurel-like leaves, which remain on the plants several years—so that they may be termed evergreen. They have, however, the spine-cushions, the tufts of woolly hair and stout spines, and the floral characters which distinguish Cactaceæ from other orders; they are also succulent, the leaves and young branches being soft and fleshy. They appear to have the same peculiar provision for enabling them to bear long periods of drought without suffering that characterises the plants of this order. The development of the spines in Pereskia is different from what takes place in all other Cacti, in which the spines are the stoutest and most numerous on the younger parts of the plant, the older or woody parts being either spineless, or much less spiny than when they were younger. Thus, in Opuntia we find few or no spines on the old parts of the stems of even such species as *O. horrida*, *O. nigricans*, &c. In Echinocactus, too, the spines about the base of old plants, if not entirely cast off, are much fewer than on the upper part. In Pereskia the contrary is the case. Taking as an example *P. aculeata*, we find that it has branches about as thick as a goose-quill, with ovate leaves, at the base of which there is a pair of curved spines, $\frac{1}{4}$ inch long, and shaped like cats' claws. But when it gets old it has a stem 3 inches in diameter, and clothed down to the ground with cushions of spines fixed firmly in the bark, each cushion composed of from twenty to fifty spines, and each spine 1 inch or more in length. From two to six new spines are developed in the centre of each healthy cushion annually. It would be impossible for any animal to climb an old stem of Pereskia. In *P. Bleo* the spines are 2 inches long, and the clusters are much larger.

The flowers of Pereskias are borne singly or in panicles, at the ends of the young, ripened branches. In shape, each flower may be compared to a single Rose, the petals being flat and spreading, and the numerous stamens forming a compact cluster in the centre,

The stigma is erect, and divided at the top into four or more rays. The fruit is a berry, shaped like a gooseberry, and covered with minute clusters of short bristles.

All the species are natives of tropical America and the West Indies.

Cultivation.

Although several of the species of Pereskia are sufficiently ornamental to be deserving of a place in gardens as flowering plants, yet they are rarely cultivated—in England, at any rate, for any other purpose than that of forming stocks upon which Epiphyllums and other Cacti are grafted. Only two species are used, viz., *P. aculeata* and *P. Bleo*, the former being used as a stock for Epiphyllum, *P. Bleo*, on account of the stoutness of its stems, being employed only for the more robust kinds.

Propagation.

Pereskias may be propagated to any extent, as every bit of branch with a leaf and eye attached is capable of rooting and soon forming a stem. The practice among those who use Pereskias as stocks for Epiphyllums is as follows: Cuttings of *P. aculeata* are planted in sandy soil, in boxes, and placed on a shelf in a stove till rooted. In about a month they are ready to be planted singly in 3-inch pots, any light soil being used; and each plant is fastened to a stake 1 foot long. They are kept in a warm, moist house, all lateral shoots being cut away, and the leader encouraged to grow as tall as possible in the year. From December the plants are kept dry to induce the wood to ripen, preparatory to their being used for grafting in February. Stocks 9 inches or 1 foot high are thus secured; if taller are required, the plants must be grown on till of the required length and firmness. Large plants may be trained against a wall or along the rafters in a warm house; and when of the required size, the branches may be spurred back, and Epiphyllums, Rhipsalis, Rat-tailed Cereus, and similar plants, grafted upon them. In this way very fine masses of the latter may be obtained in much less time than if they were grown on their own roots.

P. aculeata.

The Barbados Gooseberry. Stem woody, branching, forming a dense bush about 6 feet high. Young branches leafy; old ones brown, leafless, clothed with large cushions of long, stout, brown spines, sometimes 2 inches long. Leaves alternate, with very short petioles, at the base of which is a pair of short spines, and a small tuft of wool in the axil; blade 3 inches long by 2 inches broad, soft, fleshy, shining green. Flowers semi-transparent, watery white, in terminal panicles; sepals and petals $\frac{3}{4}$ inch long by $\frac{1}{4}$ inch wide; stamens in a large, spreading cluster, white, with yellow anthers. Ovary covered with small cushions of short bristles,

with sometimes a solitary spine in the centre of each cushion. Fruit 1 inch long, egg-shaped, red, edible. West Indies, sometimes used for fences—and a capital one it makes. Var. *rubescens* has narrower, longer leaves, glaucous-green above and tinged with red below; the spines on the old stems are shorter and more numerous in each cushion.

P. Bleo.

A stout, branching shrub, having an erect stem, 3 inches or more in diameter, with green bark and very large cushions of spines; cushion a round, hard mass of short, woolly hair, from which the

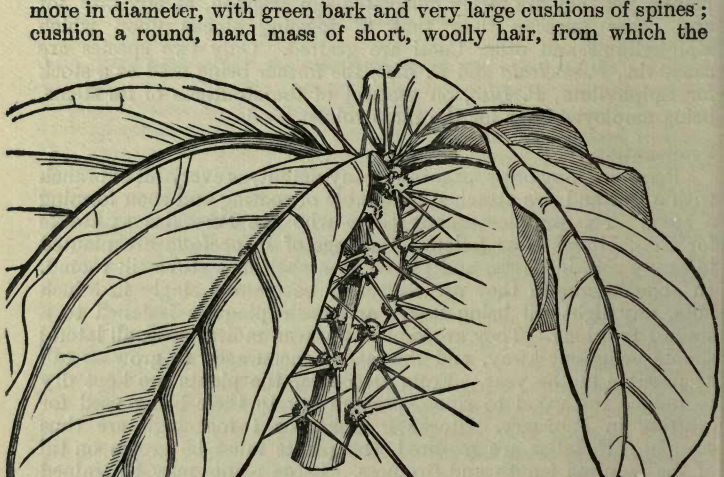

Fig. 63.—Pereskia Bleo.

spines radiate in all directions; longest spines 2 inches or more in length; one or two new ones are developed annually, and these are bright red when young, almost black when old; young branches ¼ to ½ inch in diameter. Leaves 3 to 6 inches long by 1 to 2 inches wide, oblong, pointed, with short petioles, and a small tuft of short, brown hair, with three or more reddish spines, in the axil of each. Flowers on the ends of the young, ripened branches, clustered in the upper leaf-axils, each flower 2 inches across, petals, rosy-red stamens whitish. Colombia. Probably *P. grandiflora* is the same as

this. A large specimen may be obtained in a year or two by planting it in a well-drained bed of loam, in a warm, sunny house. It blossoms almost all summer if allowed to make strong growth. Pretty little flowering plants may be had by taking ripened growths from an old plant, and rooting them, as, in the following spring they are almost certain to produce flowers. (Fig. 63.)

P. zinniæflora.

Stem erect, woody, branching freely, the branches bearing oval, acuminate, fleshy, wavy-edged, green leaves, with short petioles, and a pair of spines in the axil of each. Spine-cushions on old

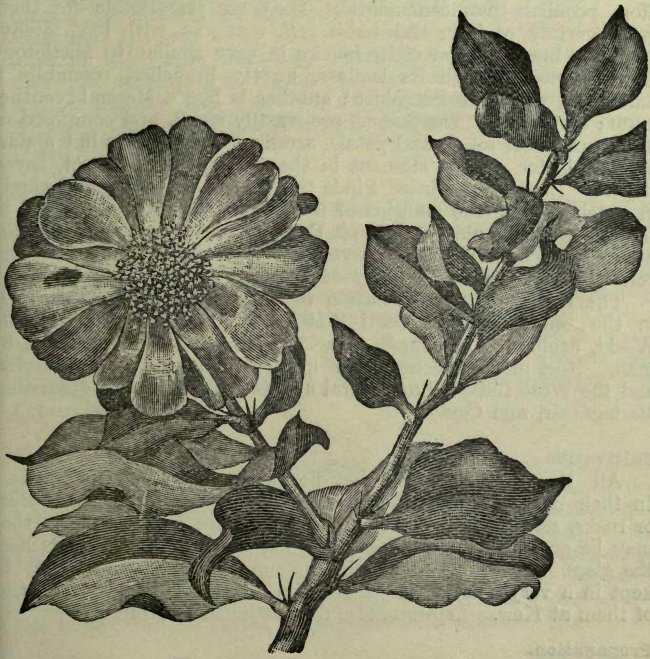

Fig. 64.—Pereskia zinniæflora.

stems crowded with stout, brown spines. Flowers rosy-red, terminal on the ripened young shoots, and composed of a whorl of broad, overlapping petals, with a cluster of stamens and measuring nearly 2 inches across. Mexico. Grows and flowers freely if kept in a warm house. (Fig 64.)

Chapter XVII.

RHIPSALIS.

About thirty species of Rhipsalis are known, most of them more peculiar than ornamental. They are remarkable for their great variety of form and habit. *R. Cassytha*, with long, fleshy, whip-like branches and white berries is very similar to Mistletoe; *R. salicornoides*, with its leafless, knotty branches, resembles a Salicornia, or Marsh Samphire; another is like a Mesembryanthemum; and so on. The flowers are usually small, and composed of numerous linear sepals and petals, arranged more or less like a star, with a cluster of thin stamens in the centre, and an erect, rayed stigma. In the flat-jointed kinds the flowers are developed singly in notches along the margins of the young, ripened joints; and in the knotted, Samphire-like kinds they are borne on the ends of the branches; occasionally they develop joints which are furrowed, and bear clusters of spines exactly as in other Cacti.

The geographical distribution of Rhipsalis is exceptional. It in the only genus of Cacti that has representatives in the Old World, excluding, of course, those which have been introduced by man. Most of the species occur in Central and South America, and the West Indies; but several are natives of Africa, Mauritius, Madagascar, and Ceylon.

Cultivation.

All the species grow and flower freely under cultivation. In their natural homes they are invariably found clinging to trees or rocks, seldom or never on the ground; but in greenhouses they may be grown in pots, a few being happiest when suspended near the glass. They do not like bright sunshine, nor should they be kept in a very shaded, moist position. There is a good collection of them at Kew. *Lepismium* is now included in Rhipsalis.

Propagation.

Seeds of Rhipsalis ripen freely, and these, if sown on sandy soil, and placed on a shelf in a warm house, germinate in a few days. The development of the seedlings is exceptionally interesting, as they are in the early stages quite Cactus-like; the gradual transition to the diverse forms which many of the species assume when

mature is remarkable. Cuttings will strike at almost any time, if planted in sandy soil and kept in a close, warm house till rooted. Some of the kinds thrive best when grafted on to a thin-stemmed Cereus. Treated in this way, *R. sarmentacea* makes 6 inches of growth in a season; whereas, on its own roots it would take about five years to grow as much.

R. Cassytha.

A pendent shrub, 4 feet or more high, growing on rocks and the mossy trunks of trees. Branches numerous, flexuous, with small branchlets or joints springing from the ends in clusters, smooth, round, the thickness of whipcord, leafless, with numerous brown, dot-like marks scattered over the surface; under a lens these dots are seen to be tufts of very fine hairs. Flowers on the sides of the young branches, small, greenish-white, short-lived; they are developed in September, and are succeeded by white berries, exactly like those of the Mistletoe, whence the name Mistletoe Cactus. Tropical America, Africa, &c. Introduced in 1758.

R. commune.

Stem straggling, branching freely, growing to a length of several feet. Branches jointed; joints varying in length, triangular, the angles compressed, and notched along the margins; notches regular, and bearing tufts of whitish hair. Strong plants produce joints over 1 inch in width. Flowers white, tinged with purple, springing singly from the notches, and composed of eight to twelve sepals and petals. Stamens and stigma erect, white, the latter four-rayed. Brazil. Introduced in 1830. Should be grown in a warm greenhouse, and treated as a basket-plant or as a small pot-shrub. Syn. *Lepismium commune.*

R. crispata.

Stem branching freely. Branches jointed and flat, like Epiphyllum. Margins of joints notched, and slightly curled. Flowers small, white, produced singly, in November and December, in the notches on the younger joints. Fruits white, pea-like, rarely ripened. A free-growing, compact stove shrub, with a bright green, healthy appearance. The similarity of its branches to Epiphyllum led to its being included in that genus by Haworth. Var. *purpurea* has larger, broader joints, bronzy-purple in colour.

R. fasciculata.

Stems terete, as thick as a goose-quill. Branches usually in clusters, and sometimes jointed, green, with small red dots and little tufts of fine, hair-like bristles. Flowers white, produced in March, springing irregularly from the older branches, small, star-like. Fruit a white berry. From its habit of growing on trees,

and the character of its stems and fruit, this plant has been called parasitical. It is, however, only indebted to the tree on which it grows for support, for it thrives if planted in a pot or basket in ordinary soil, and kept in a stove temperature. Brazil.

R. floccosa.

Stems as in *R. Cassytha*, but thicker, longer, and with the branchlets in compact clusters on the ends of the long, arching

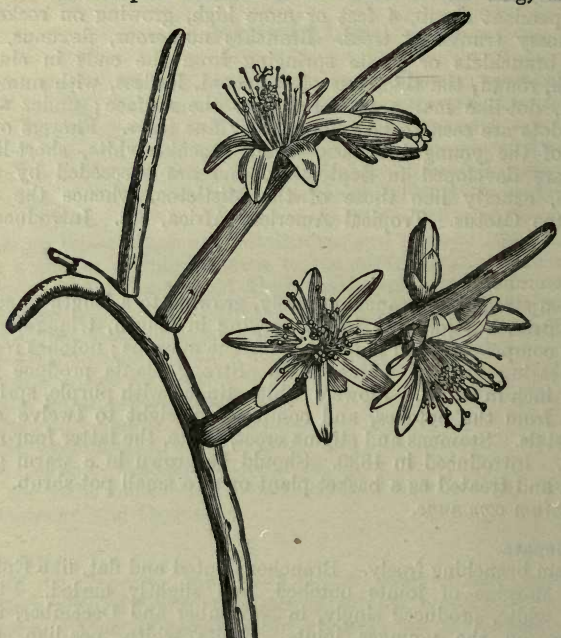

Fig. 65.—Rhipsalis funalis.

branches. The dots marking the position of the microscopic hair-tufts are in small depressions. Flowers and fruit as in *R. Cassytha*, of which this might reasonably be called a variety. Requires warm-house conditions.

R. funalis.

Stem straggling, branched. Branches numerous, consisting of long, terete joints, rather thicker than a goose-quill, glaucous-green, slightly roughened on the surface, with depressions for the

minute cushions. Branchlets usually fascicled and spreading. Flowers white, 1 inch across, produced in spring, on the sides of the young joints. Central America. An easily-grown plant, sturdy, rather straggling, but very free-flowering. In old specimens the branches become semi-pendulous. Syn. *R. grandiflora.* (Fig. 65.)

R. Houlletii.

Stems long, graceful, branching freely, round and twig-like, or with broad wings, as in Phyllocactus. Winged or flattened portions notched. Flowers springing from the notches in November; stalkless, with pointed, straw-coloured petals, forming a shallow cup about ¾ inch in diameter. Stamens and pistil white, with a tinge of red at the base. Brazil. Under cultivation, it forms a small, straggling shrub, about 3 feet high, but in its native woods its stems are many feet long, hanging from the branches of trees. It may be grown in a pot, and its branches supported by a stake, or it may be fastened against a piece of soft fern-stem, into which it will root freely. In the winter it should be kept almost dry. The flowers remain fresh for several days, and are fragrant. A well-grown plant, when in flower, is a pretty object.

R. Knightii.

Stems and joints as in *R. commune.* Wings of joints usually broad, with red margins, and the hair in the notches in a dense tuft, nearly 1 inch long, pure white, and silk-like. Flowers small, white. Brazil. It forms a straggling plant about 1 foot high. Syns. *Lepismium Knightii, Cereus Knightii.*

R. mesembryanthemoides.

A small, compact plant, with woody stems, densely covered with little fleshy, conical joints, resembling very closely the leaves of some of the Mesembryanthemums. They are green, with a few red dots, each bearing a very small tuft of the finest hair-like spines. The flowers, which are developed in March, from the joints, are ½ inch across, and yellowish-white. Fruit a small, white, round berry. South America. When grown in a warm house, in a small, round, wire basket, filled with peat and sphagnum, it forms a tuft, which in the spring produces large numbers of white, star-like flowers.

R. myosurus.

Stems dependent, several feet long, branching freely, jointed, with three or four angles or wings; the angles flattened, reddish, notched in the margin, and bearing a tuft of white, silky hairs in each notch. Flowers small, yellow, tinged with red, springing from the notches; produced in July. Brazil; introduced in 1839. Grows freely and flowers annually if planted in a basket of fibrous

soil, and suspended near the glass in a warm greenhouse or stove. It is attractive even when not in flower. Syn. *Lepismium myosurus.*

R. pachyptera

Stem woody; branches jointed, flattened as in Phyllocactus, 2 inches wide, with deep notches. Flowers small, yellowish-white, borne singly in the notches in November. Fruit a small white berry. Brazil. Syn. *Cactus alatus.*

R. paradoxa.

Stems trailing, with numerous long branches of extraordinary form. Imagine a three-angled, fleshy branch, often several feet in length, green, with smooth, reddish margins. At intervals of about 2 inches the branch has the appearance of having been twisted half round. Flowers produced in November, in the apex of the interrupted angles, small, white. Brazil.

R. penduliflora.

Stem thin, with smooth, green branches, no thicker than whip-cord, and numerous fascicled or clustered, small joints, ½ inch long, green, with red dots, angular when young. Flowers on the tips of the terminal joints, pale yellow, ½ inch across, developing in August. Fruit white, Mistletoe-like. Tropical. America. Requires stove treatment. Var. *laxa* (loose) has the branches curved and more lax.

R. pentaptera.

Stems erect; branches stiff, long-jointed, with five wing-like angles, slightly spiral, the angles notched at intervals of 1 inch. Flowers in the notches, ½ inch across, white, produced in August. Fruit a white, Mistletoe-like berry. Brazil. Grown in a tropical house, it forms a compact pot-shrub, 2 feet high, and is attractive on account of its peculiar stems.

R. rhombea.

Stems and branches as in *R. crispata*, but without the wavy margins, and with more elongated joints. Flowers small, white, produced in the notches of the joints in November. Fruit a shining milk-white berry. Brazil. Should be grown in pots, in the stove, and encouraged to form a globose bush.

R. Saglionis.

A tiny plant, 6 inches high, similar in habit to *R. penduliflora*, but with brown branches, the small joints angled, and bearing silky hairs. The branches and joints are set at zigzag angles. Flowers pale yellow, produced in autumn on the younger joints. Fruits white, mistletoe-like. Buenos Ayres. A delicate plant requiring stove treatment. Syn. *R. brachiata.*

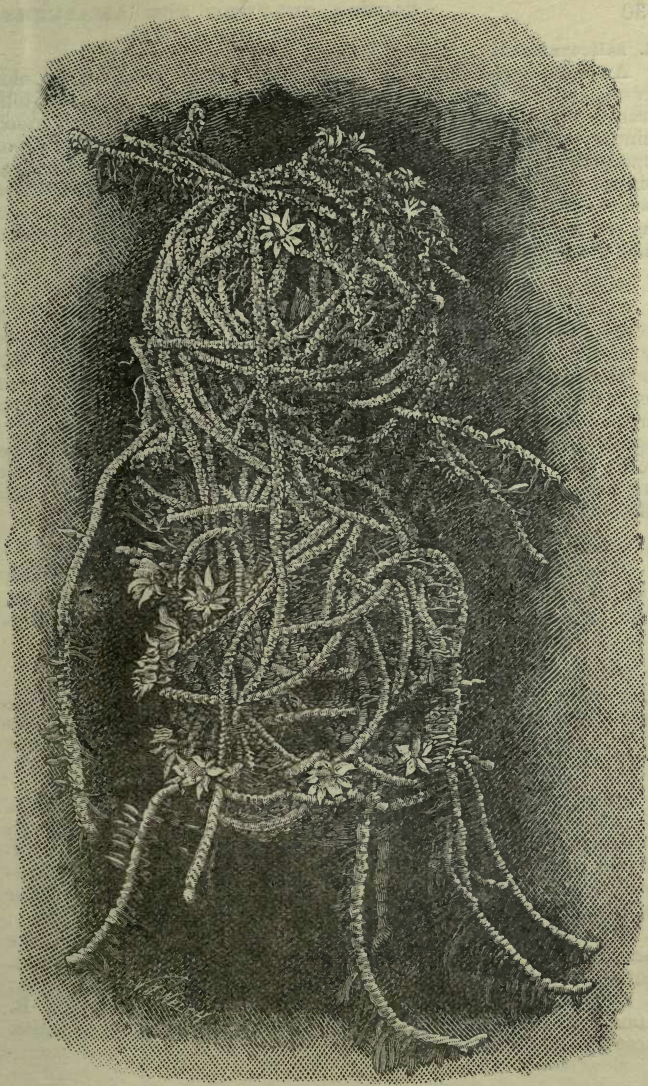

Fig. 66.—Rhipsalis sarmentacea.

R. salicornoides.

An erect plant 3 feet or more high. Stem woody when old, brown, jointed like hens' toes, not quite as thick as a goose-quill. Branches in clusters; joints ½ to 1 inch long, the lower half much thinner than the upper, so that the joints look like a number of superposed, miniature clubs. Flowers on the ends of the terminal joints, yellow, becoming red with age. Brazil. An attractive remarkable-looking plant when it is in flower in spring. Var. *stricta* has the joints all pointing upwards, and is more compact in growth than the type.

R. sarmentacea.

A creeping, prostrate plant, with fluted stems as thick as a goose-quill, which attach themselves to tree-trunks or other bodies by means of numerous adventitious roots, which spring from the under side of the stems. Surface of stem covered with numerous small clusters of short, hair-like, whitish spines. Flowers 1 inch across, with pointed, creamy-white petals; stamens spreading; stigma erect, four-lobed. Fruit small, currant-like. Should be grown in a stove in a basket of peat fibre, or on a piece of soft fern-stem. It is always attached to the branches of trees when wild. (Fig. 66.)

R. Swartziana.

Older stems three-angled, young ones flattened, jointed; joints 2 inches broad, stiff, with deep notches. Flowers in the notches, small, white, produced in June. Jamaica. Stiff, Phyllocactus-like. About 2 feet high.

R. trigona.

Habit straggling; branches usually forked, ¼ inch in diameter, three-angled; angles wavy or slightly notched, grey-green. Flowers small, produced in spring in the notches of the angles, white. Fruit a white berry. Brazil.

A large number of species have lately been added to the cultivated representatives of this genus. They are, however, chiefly of botanical interest, few fanciers caring to grow more than half-a-dozen or so, the flowers being in most cases small and unattractive. The following may be noted: R. PULVINIGERA, similar to *R. floccosa*, branches terete, flowers small, white and green; R. REGNELLII, similar to *R. Houlletii*, but the flowers are smaller; R. DISSIMILIS, in the way of *R. funalis*, with stout, jointed, cylindric stems, bearing tufts of setæ ¼ inch long; R. ROBUSTA, stems stout, terete, with flowers near apex; R. HADROSMA, stems terete, light green, flowers transparent white. These are all Brazilian.

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